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Original Research Article

Role of Maternal Nutritional Awareness and Risk Factors in Prevention of Nutritional Anemia in the Early Childhood

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Abstract

Aim: The aim of the present study was to analyze the risk factors and vital role of mothers in prevention of nutritional anemia in the early childhood

Methods: This study was carried out children aged 6 months–2 years admitted at the hospital during the study period were included. Any child with chronic disorders such as hemoglobinopathies, hemolytic anemia, and treated for anemia and those on any immunosuppressants such as steroids and biologics were excluded as an indirect measure to eliminate anemia of chronic disease.

Results: Majority of the mothers were aware that neural development of child could be affected by anemia. Maternal knowledge regarding cow's milk was poor and had a faulty belief that it increases iron absorption, whereas 13% were unaware of the relationship between cow's milk and anemia. Many mothers (71%) believed anemia to occur only in children on vegetarian diet. Around 75% mothers recognized green leaves and jaggery to be enriched with iron. Although 78% identified vitamin C containing fruits, many were not aware of its vital role in increasing the iron absorption. Mothers of children with more than one sibling had a relatively greater incidence of "poor" knowledge unlike mothers of children with single or no sibling. This implies that those with "poor" knowledge were also unaware of the importance of birth spacing.

Conclusion: Recognizing the causative factors plays an essential role in preventing iron deficiency anemia (IDA). Exclusive breastfeeding must be promoted, along with avoiding excessive cow's milk intake. Intervening at the right period with age-appropriate foods becomes a necessity. Maternal illiteracy has a positive correlation with anemia in infants. Improving maternal awareness by the physicians will pave the road toward a nation free from anemia.

Keywords: Maternal awareness, Iron deficiency anemia, Child nutrition, Weaning.

Introduction

Anemia is the most common nutritional deficiency disorder globally, affecting a quarter of the world population, especially children and women of reproductive age group, resulting in public health problem of paramount importance. [1] Anemia, a major global public health burden, affects 25% of the population [2] Although anemia is multifactorial, iron deficiency anemia (IDA) is the major cause (42%). [3] The prevalence of anaemia among children under 5 years of age is estimated to be about 20% in industrialized countries and 39% in non-industrialized countries. [4]

Causes of anemia include blood loss, infections, acute and chronic diseases, micronutrient deficiencies, splenomegaly, and hemoglobinopathies. [5,6] Anemia is associated with adverse reproductive outcomes such as preterm delivery, low-birthweight infants, and decreased iron stores for the baby, which leads to impaired health and productivity later in life. [7] Failure to reduce anemia may result in maternal and neonatal deaths, a combination that accounts for 2.5–3.4 million deaths worldwide. [8] Anemia is an indicator of both poor nutrition and poor health. [9] Women of reproductive age and children are deemed the most vulnerable to micronutrient deficiencies due to greater physiological requirements. [10]

Anemia is often associated with multiple proximal risk factors (iron and vitamin A deficiencies, inflammation, malaria, age, gender, and body mass index [BMI]) and distal risk factors (education status, sanitation and hygiene facilities, and urban or rural residence). In India, the national program for prevention and control of anaemia focuses on pregnant women and young children less than 5 years. Nutritional programming states that both an excess and a deficiency of nutrients in the first 1000 days of a child can have long-term effects on developing tissues and reprogram the metabolism. This has a huge impact on health in adulthood. Nutritional programming is also important for ensuring an adequate supply of micronutrients. [11-13] Nutritional programming clearly demonstrates the correlation between child malnutrition and adult prevalence of cardiovascular disease, obesity, osteoporosis, hypertension, impaired glucose tolerance, insulin resistance and type 2 diabetes. [14,15]

Hence the aim of the study was to analyze the risk factors and vital role of mothers in prevention of nutritional anemia in the early childhood.

Material & Methods

This study was carried out at Department of Pediatrics, Anugrah Narayan Magadh Medical college and Hospital, Gaya ,Bihar, india for 12 months and children aged 6 months–2 years admitted at the hospital during the study period were included. Any child with chronic disorders such as hemoglobinopathies, hemolytic anemia, and treated for anemia and those on any immuno suppressants such as steroids and biologics were excluded as an indirect measure to eliminate anemia of chronic disease. A total of 500 participants were included.

Later, a pre-designed pro forma was used to record the relevant information. The two pages pro forma would include six sets of questionnaire. Only the mother was allowed to answer the questionnaire. The first part comprises general details including demography, personal data, socioeconomic status, and family background. Information pertaining to significant history of both mother and child was included in the second part. A detailed nutritional history of the child was assessed in the third part of the pro forma. Clinical presentation and investigation details were recorded in the fourth and the fifth, respectively. The final part of the questionnaire was added to analyze the awareness of the mothers on anemia and their extent of knowledge on the risk factors, clinical features, and the importance of treating IDA. Length and weight were measured uniformly using infantometer and digital weighing machine to the nearest 0.1 cm and 0.001 kg, respectively. Nourishment was graded based on the World Health Organization (WHO) guidelines and chronically malnourished children were excluded from the study. [16] Children were classified based on Modified Kuppuswamy scale of socioeconomic strata. [17] Two generations of family living in the same household were considered ‘nuclear” family. Anything beyond was considered “joint” family. Complete blood count including red blood cell indices was calculated using Coulter LH 780 Hematology analyzer. Mentzer index was calculated along to differentiate between IDA and Thalassemia. Anemia was graded as per the WHO guidelines. [2] Questionnaire was prepared in both English and vernacular language for better understanding. On designing the questionnaire, it was validated by an expert panel consisting of a Pediatrician, healthcare workers, and academic professionals including experts in vernacular language for easy comprehensibility.

Statistical Analysis

Anemia was the primary outcome variable and knowledge on nutrition/anemia was considered as the secondary variable. Descriptive analysis was carried out by mean and standard deviation for quantitative variables, frequency, and proportion for categorical variables. The association between variables of anemia and quantitative outcome was assessed by comparing the mean values. Independent sample t-test was used to assess the statistical significance. The association between explanatory variables and categorical outcomes was assessed by cross tabulation and comparison of percentages. Chi-square test was used to test the significance of statistics. $p<0.05$ was considered statistically significant. IBM SPSS version 22 was used for statistical analysis. [18]

Results

Table 1: Tabular column showing the percentage of answers by the mothers

Correct answer	No. of correct answers (%)	No. of incorrect answers (%)
Anemia is a deficiency of hemoglobin	385 (77)	115 (23)
Iron is important for carrying oxygen in the blood to various organs	125 (25)	375 (75)
Infants at weaning age are at high risk for anemia	100 (20)	400 (80)
Infants at weaning age are at high risk for anemia	120 (24)	380 (76)
Anemia affects both vegetarians and non-vegetarians equally	75 (15)	425 (85)

Large quantities of cow's milk decreases iron absorption	75 (15)	425 (85)
Complementary feeds should be started at 6 months	85 (17)	415 (83)
Jaggery contains more iron	350 (70)	150 (30)
Green leaves are rich in iron	375 (75)	125 (25)
Meat is rich in iron	90 (18)	410 (82)
Orange is rich in vitamin C	400 (80)	100 (20)
If mother takes iron supplements, breastfed infant doesn't get more iron	400 (80)	100 (20)
Vitamin C is necessary for absorption of iron	390 (78)	110 (22)
Anemia is often asymptomatic	390 (78)	110 (22)
Anemia can cause neurodevelopmental delay in infants	390 (78)	110 (22)
Government provides free iron supplements	50 (10)	450 (90)
Anemia can be prevented	370 (74)	130 (26)
Iron causes constipation but should not be avoided	20 (4)	480 (96)
Blood transfusion is not necessary for all children with anemia	50 (10)	450 (90)

Majority of the mothers were aware that neural development of child could be affected by anemia. Maternal knowledge regarding cow's milk was poor and had a faulty belief that it increases iron absorption, whereas 13% were unaware of the relationship between cow's milk and anemia. Many mothers (71%) believed anemia to occur only in children on vegetarian diet. Around 75% mothers recognized green leaves and jaggery to be enriched with iron. Although 78% identified vitamin C containing fruits, many were not aware of its vital role in increasing the iron absorption.

Table 2: Comparison of number of siblings across knowledge about nutrition and anemia

Number of siblings	Maternal awareness on anemia and nutrition			Chi square	P Value
	Poor knowledge (%)	Fair knowledge (%)	Good knowledge (%)		
Nil (100)	18 (18)	72 (72)	10 (10)	14.284	0.012
One (350)	55 (15.72)	245 (70)	50 (14.28)		
More than one (50)	19 (38)	26 (52)	5 (10)		

Mothers of children with more than one sibling had a relatively greater incidence of "poor" knowledge unlike mothers of children with single or no sibling. This implies that those with "poor" knowledge were also unaware of the importance of birth spacing.

Discussion

Anemia, a major global public health burden, affects 25% of the population worldwide. [19] Although anemia is multifactorial, iron deficiency anemia (IDA) is the major cause (42%). [20] Affected children have nonspecific symptoms; therefore, a greater proportion of them remains undiagnosed unless a health problem ensue. [19,21] Inappropriate weaning in the infancy and faulty feeding practices is some of the early contributors to anemia. Apart from these amenable risk factors, low birth weight and premature infants are at a higher risk of developing anemia. [22] All these factors, leading to IDA during infantile and early childhood, has a negative impact on the motor and neuro-cognitive function. [23] Iron is an essential nutrient for a child's proper development at every growth stage. [24] Iron is crucial for the production of new red blood and muscle cells, DNA replication, and the development of the brain, nervous and immune systems. [24-26] Iron deficiency in infants can result in poor memory and attention, a higher risk of attention-deficit hyperactivity disorder, visual and auditory system impairment and social and emotional behaviours. [27]

Majority of the mothers were aware that neural development of child could be affected by anemia. Maternal knowledge regarding cow's milk was poor and had a faulty belief that it increases iron absorption, whereas 13% were unaware of the relationship between cow's milk and anemia. Many mothers (71%) believed anemia to occur only in children on vegetarian diet. Around 75% mothers recognized green leaves and jaggery to be enriched with iron. Although 78% identified vitamin C containing fruits, many were not aware of its vital role in increasing the iron absorption. Mothers of children with more than one sibling had a relatively greater incidence of "poor" knowledge unlike mothers of children with single or no sibling. This implies that those with "poor" knowledge were also unaware of the importance of birth spacing. This stresses the importance of the WHO's exclusive breast feeding in the early infancy sufficing the lesser iron requirements. Only 17% of mothers were aware of the importance of timely

introduction of complementary feeds, proving the misconceptions on duration of breast feeding. Iron requirements after 6 months are 0.9–1.3 mg/kg/day [28], whereas the iron content of cow's milk is 0.2–0.5 mg/L, of which only 10% is absorbed. [29] In addition, cow's milk causes asymptomatic micro-hemorrhages in intestine further increasing the loss of iron. [30] This explains the reason why excess cow's milk had a negative influence on hemoglobin level in our study.

Several mothers believed that only children on vegetarian diet would be affected by IDA. However, iron status is a common nutritional problem among both vegetarian and nonvegetarian consumers, despite few studies reporting IDA of higher incidence in the former. This relative increase in IDA among vegetarians is probably due to their dependence on non-heme iron and the presence of iron absorption inhibitors in plant foods. [31] Apt feeding practices are thus fundamentally important to ensure an appropriate nutrition in a growing child. Clinical features are non-specific in anemic children as evidenced in our study, which when untreated lead to neurodevelopment delay and cognitive deficits. Their attention span is often reduced and this reflects on the child's academic performance. [23,32] On a positive note, most of the mothers had acknowledged the possibility of neural development being affected by anemia. Understanding this would stress the importance of supplementing iron in infants. The prime source of knowledge in our study was the community health workers. Training and engagement of the health workers are critical in increasing the healthcare awareness in low- to middle-income countries. [33] Parenting knowledge plays a key role in the biological, physical, socioeconomic, and cognitive needs of the child. It also has a direct influence on their everyday decisions about upbringing, developmental expectations which, in turn, determines their child's health and well-being. [34] Overall most of the mothers had "fair" knowledge of anemia and its implications. Mothers with "poor" understanding of nutrition predominantly had anemic children. Furthermore, mothers with better educational status had better awareness in terms of questionnaire. Thus, maternal knowledge plays a key role in preventing anemia.

Conclusion

Despite the advent of the internet available in everyone's hand, the knowledge of anemia remains shallow. Nutrition in the latter half of infancy is vital. Information regarding the negative influences of cow's milk on hemoglobin ought to be spread. Mothers must be enlightened on the importance and source of nourishment in a weaning child. Improving maternal educational status will address the concerns on IDA. Ultimate goal must be to target the mothers to take rational decisions rather than believing the faculty of age-old aphorisms. Role of Pediatricians in creating adequate awareness among these mothers is enormous.

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