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MATERNAL NUTRITIONAL AWARENESS AND IRON DEFICIENCY ANEMIA IN CHILDREN AGED 6 MONTHS–2 YEARS IN A TERTIARY CARE HOSPITAL

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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.

Material & methods: This study was carried out in the Department of Pediatrics, GS Medical College, Pilkhuwa, Uttar Pradesh for the duration of 1 year. Children aged 6 months–2 years admitted at the hospital during the study period were included. The study protocol was approved by the Hospital Ethics and Scientific Committee. An informed written consent was obtained from the mothers of these children. A total of 200 parents were given the questionnaire on a one-to-one interview basis.

Results: Majority (78%) of the mothers were aware that neural development of child could be affected by anemia. Maternal knowledge regarding cow's milk was poor as 85% had a faulty belief that it increases iron absorption, whereas 15% were unaware of the relationship between cow's milk and anemia. Many mothers believed anemia to occur only in children on vegetarian diet. Around 72% 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. Most had a misconception that meat contains only fats, not iron. These results stress the importance of maternal knowledge on nutrition and iron. 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 (p 0.012).

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.

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Keywords: Maternal awareness, Iron deficiency anemia, Child nutrition, Weaning, Iron Deficiency Anemia, Hemoglobin Level, Nutritional Knowledge, Maternal Education.

1. 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] It affects 25% of the population worldwide.[2] Although anemia is multifactorial, iron deficiency anemia (IDA) is the major cause (42%).[3] Affected children have nonspecific symptoms; therefore, a greater proportion of them remains undiagnosed unless a health problem ensue.[2,4]

Anemia in pregnancy is identified by the World Health Organization as hemoglobin levels less than 11 gm/dl.[5] Iron deficiency anemia is the most common nutritional problem in the world today, accounting for approximately 50% of cases worldwide,[6] and it is the cause of 75% of anemia cases during pregnancy.[7] It also has adverse effects on neonatal outcomes like[8] fetal anaemia, stillbirth, and low and very low birth weight (LBW).[9,10]

Maternal nutritional deficiency during pregnancy affects the developmental process of the fetus, which subsequently influences the birth weight of the newborn.[11] The fetus is highly dependent on maternal nutritional intake since malnutrition during pregnancy leads to different adverse birth outcomes like LBW. During pregnancy, insufficient storage or inadequate intake of essential nutrients can cause harmful effects on both the mothers and newborn babies.[12-14] The strategies of anemia prevention are iron supplementation, regular de-worming, control, and prevention of parasitic infections in pregnancy, such as by using insecticide-treated bed net consistently, intake of iron-rich foods, nutritional counseling such as not taking coffee, tea, or milk with meals, accessing clean and adequate water, and by treating the underlying causes and complications.[15]

Overall, normal pregnancy increases the iron requirement by 2 to 3-fold and the folate requirement by 10 to 20-fold.[16-18] The Centers for Disease Control and Prevention recommend screening for anemia in pregnant women and universal iron supplementation to meet the iron requirements of pregnancy.[19] The WHO also recommends that all pregnant women receive iron supplements of 60mg daily combined with a pill that also contains 400µg of folic acid.[20]

Adherence to anemia prevention strategies plays a major role in the prevention and treatment of anemia among pregnant women whose iron requirement increases due to physiologic demands.[16] Having knowledge of anemia and following through with the proper practice of anemia prevention methods are vital to reducing the prevalence of anemia.[21]

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

2. MATERIAL & METHODS

This study was carried out in the Department of Pediatrics, GS Medical College, Pilkhuwa, Uttar Pradesh for the duration of 1 year. Children aged 6 months–2 years admitted at the hospital during the study period were included. The study protocol was approved by the Hospital Ethics and Scientific Committee. An informed written consent was obtained from the mothers of these children.

Exclusion criteria

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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.

METHODOLOGY

A pre-designed pro forma was used to record the relevant information. The two pages pro forma would include six sets of questionnaires. 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. [22] Children were classified based on Modified Kuppuswamy scale of socioeconomic strata. [23] 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.[24] On designing the questionnaire, it was validated by an expert panel consisting of a Pediatrician, healthcare workers, and academic professionals for easy comprehensibility. A pilot study consisting of 100 mothers was performed. Initial questionnaire and methodology were modified based on the interpretations from the same with the help of experts.

A total of 200 parents were given the questionnaire on a one-to-one interview basis. Average time taken to complete the questionnaire was 20 min. Any queries raised by the parents, while answering the questions was clarified in person.

Statistical Analysis

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. 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.

3. 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	150 (75)	50 (25)

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Iron is important for carrying oxygen in the blood to various organs	52 (26)	148 (74)
Infants at weaning age are at high risk for anemia	36 (18)	164 (82)
Low birth weight is a risk factor for anemia in newborns	48 (24)	152 (76)
Anemia affects both vegetarians and non-vegetarians equally	32 (16)	168 (84)
Large quantities of cow's milk decreases iron absorption	30 (15)	170 (85)
Complementary feeds should be started at 6 months	32 (16)	168 (84)
Jaggery contains more iron	140 (70)	60 (36)
Green leaves are rich in iron	144 (72)	56 (28)
Meat is rich in iron	36 (18)	164 (82)
Orange is rich in vitamin C	160 (80)	40 (20)
If mother takes iron supplements, breastfed infant doesn't get more iron	160 (80)	40 (20)
Vitamin C is necessary for absorption of iron	156 (78)	44 (22)
Anemia is often asymptomatic	156 (78)	44 (22)
Anemia can cause neurodevelopmental delay in infants	156 (78)	44 (22)
Government provides free iron supplements	20 (10)	180 (90)
Anemia can be prevented	150 (75)	50 (25)
Iron causes constipation but should not be avoided.	6 (3)	194 (97)
Blood transfusion is not necessary for all children with anemia	20 (10)	180 (90)

Majority (78%) of the mothers were aware that neural development of child could be affected by anemia. Maternal knowledge regarding cow's milk was poor as 85% had a faulty belief that it increases iron absorption, whereas 15% were unaware of the relationship between cow's milk and anemia. Many mothers believed anemia to occur only in children on vegetarian diet. Around 72% 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. Most had a misconception that meat contains only fats, not iron. These results stress the importance of maternal knowledge on nutrition and iron.

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

Number of siblings	Maternal awareness on anemia and nutrition			p value
	Poor knowledge	Fair knowledge	Good knowledge	
Nil (N=40)	6	30	4	0.012
One (N=150)	22	104	24	
More than one (N=10)	3	6	1	

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 (p 0.012).

4. DISCUSSION

Anemia is considered the most common blood disorder which affects about one-third of the global population.[25] It is characterized by a decline in the number or size of red blood cells and hemoglobin concentration and results in an impaired capacity to transport oxygen.[26] Globally, the prevalence of anemia in pregnancy is estimated to be approximately 38.2%.[27]
Majority (78%) of the mothers were aware that neural development of child could be affected by anemia. Maternal knowledge regarding cow's milk was poor as 85% had a faulty belief that it increases iron absorption, whereas 15% were unaware of the relationship between cow's milk and anemia. Around 72% 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. Most had a misconception that meat contains only fats, not iron. These results stress the importance of maternal knowledge on nutrition and iron. Our study had more anemic children in older mothers unlike other studies probably due to higher age cutoff and associated health effects.[28,29] Mother's level of education and the impact on the child has been re-established in our study as mothers with minimal education (upto primary school) had 85% of their children with anemia.[30,31]
Iron requirements after 6 months are 0.9–1.3 mg/kg/day[32], whereas the iron content of cow's milk is 0.2–0.5 mg/L, of which only 10% is absorbed.[33] In addition, cow's milk causes asymptomatic micro-hemorrhages in intestine further increasing the loss of iron.[34] Another study in India also showed that maternal anaemia increases the incidence of LBW babies by 6.5%.[35] These might be due to the occurrence of anaemia secondary to hemodilution physiologically. Moreover, anaemia during pregnancy might be happening due to inadequate intake of nutrients, unable to take the recommended dose of Iron with folic acid supplementation during pregnancy, poor preconception and conception care, morbidity during pregnancy like helminthiasis, and poor diet quality. All these factors will directly or indirectly cause LBW. 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.[36] Apt feeding practices are thus fundamentally important to ensure an appropriate nutrition in a growing child.

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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 (p 0.012). 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.[37] 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.

5. 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.

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