Anemia in children: A cross sectional study in a tertiary care centre

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Abstract
Introduction: Anemia in children may be due to a single cause or multiple causes and affects the child's health as well as their physical and cognitive development, immunity, thereby making them more sensitive to infections and mortality.
Materials and Methods: 150 children were subjected to clinical examiantions and investigations such as complete blood picture, hemoglobin and hematocrit estimation, ova and cyst identification hematological examination and biochemical reactions such as serum iron, serum ferritin, transferrin saturation was done.
Results: 42% were males and 58% were females in the present study. Most of the children (34%) were between the ages of 12-23 months, followed by 22.7% between 1 -11 months old and 18.7% were between 24–35 months. Diarrhoea was the chief complaint in 16%, 10% with respiratory tract illness and 4.7% with asthma. The nutritional status of most of the patients was normal.
Conclusion: Diet which is deficient in iron and its supplements is the main cause for anemia in the children below 5 years. Adequate education regarding the importance of health hygiene and sanitation along with importance of the proper nutrition is of utmost importance to the parents of these children and to the pregnant women.

Keywords: Anemia, children, Nutritional diet.

Introduction
Anemia is one of the prominent global problem which affects the general health of the population of the world as well as the social and economic status of a nation.[1] It may be due to a single cause or multiple causes and affects the child's health as well as their physical and cognitive development, immunity, thereby making them more sensitive to infections and mortality.[2,3]

The global prevalence of anemia in children below the age of 5 has been estimated to be around 47.4%[1].In South East Asia, a total of 616 million people are at risk[4] of which 293 million are children, 89 million reside in India.[5] The most affected region is the Sub Saharan region with a prevalence of 62.3%.[6]

The consequences of anemia is both short term and long term, with serious impact on the children.[7] Apart from impairing the motor and cognitive growth, anemia can also cause social and emotional distress, thus affecting the child's performance in schools.[8,9] Moreover, it had been observed that even if anemia is treated at a later stage, its consequence cannot be reversed.[10]

The cause for most of the anemia cases is iron deficiency, which may be due to the bad food habits, especially in the weaning period. During the weaning times, the food given may be benefit of iron and other nutrients including Vit B 12 and folic acid.[11,12]

The aim of this study was to analyse the risk factors of anemia in very young children in our area so that prevention and control methods can be evaluated.

Materials and Methods
This cross sectional study was done by the Department of Pediatrics at Fathima institute of medical sciences, Kadapa for a period of from March 2016 to Sept 2019 after the clearance from the Institutional Ethical Committee. 150 children from 6 months to 60 months, whose hemoglobin level was below 11gm/dl were included into the study. The nature of the study was explained to the parents and informed consent was taken from them. All these children had a ferritin level less than 12 µg/ L. Children over the age of 5 years, those with hemolytic anemia or any other chronic disease or anemia due to leukemia or aplastic anemia were excluded from the study.

Detailed history of the patient was noted on admission. A thorough physical and clinical examination was done for all the patients. Blood was collected by venous puncture and was sent to the laboratory for complete blood picture, hemoglobin and hematocrit estimation. Stool samples were also sent for the detection of ova and cyst of parasites. The hematological examination done included white blood count, both total and differential, total RBC count, mean corpuscular volume, reticulocyte count, hemoglobin concentration, erythrocyte sedimentation rate, serum iron, serum ferritin, transferrin saturation. A hemoglobin level of < 11 g/dl was taken as anemia. 10.00 to 10.9 was considered to be mild anemia, 7.0-9.9 g/dL as moderate, and less than 7.0 as severe anemia. Statistical analysis was done using Microsoft excel and data was presented as graphs and tables.

Results
150 children below the ages of 5 years and with a hemoglobin level of <11 gm/dL were included into the study. Out of these children, 63were males and 87 were females accounting to 42% and 58% respectively (Fig. 1).

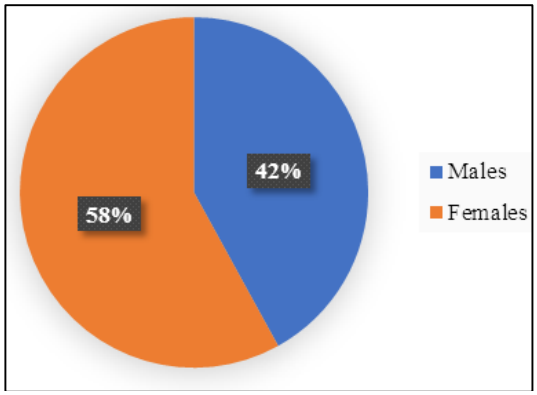

Fig. 1: Sex wise distribution of patients

Around 51 children were between the ages of 12-23 months (34%) i.e in the second year of their life. 34 children were 1-11 months old (22.7%), while 28 children were between 24 – 35 months (18.7%). 23 of them were between 3-4 years while 16 were 48 to 60 months of age (10.7%) (Fig. 2).

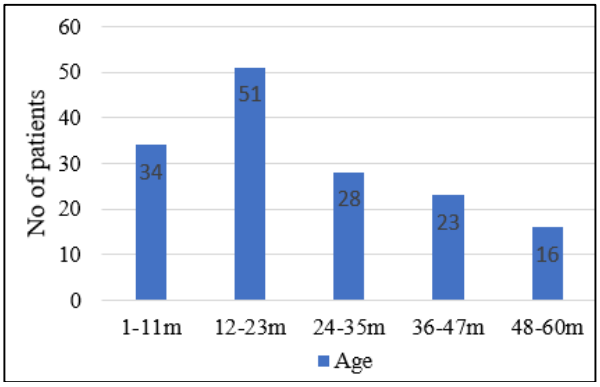

Fig. 2: Age wise distribution of patients

Some of the children had a previous history of illness which could have lead to the prevalence of anemia. 24 of the children (16%) had come to the hospital with diarrhea as the chief complaint, while 15 of them had respiratory tract illness (10%). 7 children (4.7%) had complaints of asthma, 5 (3.3%) had parasitic infestations, 3 had complaints of bleeding, one patient had come with reaction due to drug ingestion (Fig. 3).

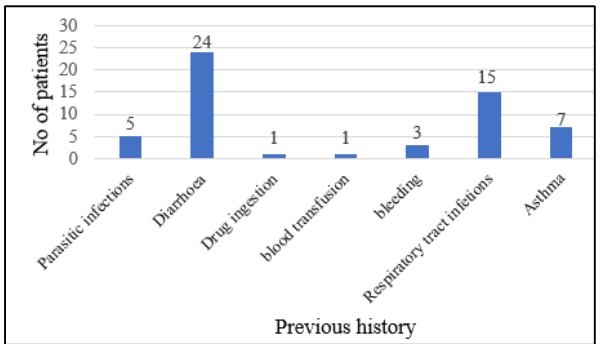

Fig. 3: Past history

The nutritional status of most of the children was within the normal limits and only 11 children (7.3%) were malnourished and 6 (4%) were overweight (Table 1)

Table 1: Nutritional status

Malnourished	11(7.3%)
Normal	133(88.7%)
Overweight	6(4%)

Most of the mothers of the anemic children were uneducated (57,3%) while 48 (32%) were educated upto the primary level. 13 (8.7%) of them were educated up to the secondary level and more than secondary level education was seen in only 3 (2%) of the cases. 103 (68.7%) of the mothers were working, many as house maids or as daily labourers. 47 (31.3%) of them were home makers. Majority of the mother s were anemic (92 (61.3%), while 58 (38.7%) of them were having the hemoglobin levels in the normal range (Table 2).

Table 2: Maternal factors

Variables	Number	Percentage
Mothers age		
<24 years	41	27.3%
24-34 years	76	50.7%
>35 years	33	22%
Mothers educational status		
No education	86	57.3%
Primary	48	32%
Secondary	13	8.7%
>Secondary	3	2%
Mothers occupational status		
Working	103	68.7%
Not working	47	31.3%
Mothers anemia status		
Anemic	92	61.3%
Normal	58	38.7%

Discussion

Occurrence of anemia among the malnourished children below the age of 5 is well documented.[13-17] Moreover many of the studies were population based studies. This hospital based study has however brought about the anemic conditions among the young children with considerably good nutrition.

The present study was not a prevalence one. However, the prevalence was very high in our area. Almost 1 in every 3 children admitted to hospital were anemic. A very high prevalence of anemia was found in several other studies. A 55.1% of prevalence was seen in a study by Salzano et al.[18] A huge prevalence of 89.1% was seen in a healthcare clinic in Recife by Leal and Osorio.[19]

In the present study, the number of female children who were anemic (58%) were slightly higher than that of the males (42%). An association of boys with anemia was observed in a study by Torres et al and by Oliveira et al.[12,20]

In these studies the prevalence of anemia in boys was attributed to the faster growth rate of the boys in these ages compared to the girls, where in the demand of higher iron levels cannot be satisfied by nutrition alone. However in a study by Verma et al, in accordance to our study, the number of female children being affected was higher than males.[25]

The most common age group to be affected was between 12-23 months, followed by 1-11 months and 24-35 months. This was in accordance to studies conducted in day care centres, were also children below 24 months were found to be anemic.[27-29] At this age, the brain growth is faster with the central nervous system being more permeable to iron. Therefore a deficiency in iron can result in serious consequences.

However no association of gender with anemia has been found in studies by Rocha et al and Silva et al.[21,22] In most of these cases, the low hemoglobin level was directly related to the early weaning of the child from breastmilk to foods with low iron levels.

In our study, most of the children affected had normal weight levels, while under nourished levels were seen only in 7.3% and obesity was observed in 4%. This rise in obesity and anemia could probably be to the intake of junk food which contain lower levels of nutrition. A reduction in malnourishment and an increase in the obesity levels were seen in another study, Rosemary et al. They reported that this increase in the obesity rate was due to the nutritional and epidemiological changes. Apart from a lack of minerals and vitamins in these children, there was a deficiency in protein and calories.[23] The iron deficiency in the normally nourished children could be due to the low bioavailability of iron in Indian foods, as well as in the junk foods. These results were similar to those by Verma et al[25] and Thavraj et al,[26] who also found a considerable percent of children apparently well nourished to have low levels of hemoglobin. A previous history of gastrointesrinal disturbances and respiratory tract infections was seen in majority of the children, followed by asthma. This could probably be to the fact that utilization of hemoglobin is higher in both the cases. Children with parasitic infection resulting in blood loss also had anemia. Lima et al also reported a prevalence of anemia in children with parasitic infections.[24] while in a study by Rosemary et al, gastrointestinal and respiratory disorders were reported to be a major cause, corroborating our study.[23]

The younger mothers, i.e those below 24 years were more anemic than the others in the present study. The probability of this was due to the poor economic levels of the parents thereby not eating nutritional food during pregnancy as well as during breast feeding. Similar reports were seen in a study by Zuffo et al.[30]

Conclusion

Diet which is deficient in iron and its supplements is the main cause for anemia in the children below 5 years. The most common symptom was gastrointestinal problems. Socio-economic status, the young age of the mother also play a major role. Therefore adequate education regarding the importance of health hygiene and sanitation along with importance of the proper nutrition is of utmost importance to the parents of these children and to the pregnant women.

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None.

Conflict of interest

None.

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