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A Hospital Based Study in Anemia Prevalence in Children of South India- Vikarabad

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Abstract

Background: In India, anemia is a major public health problem, affecting all age classes, but the most affected are children and women in the child-bearing age group. Data from South Indian (Vikarabad) hospital patients, however, is not available. We intended to research the prevalence of anemia in a tertiary care hospital among children aged 2-12 years of age. **Materials and Methods:** From November 2018 to August 2019, a total of 526 children aged 2-12 years were enrolled in the research over 9 months. Using the completely automatic Hematanalyser, a total blood count was obtained by taking 2ml of blood. In compliance with the World Health Organisation (WHO) standard for the given age, anemia was diagnosed. Using informative and inferential statistics, the data was analysed and interpreted. **Results:** The average incidence of anemia was 33.07 percent for children 2-12 years old. The most prevalent (56.32 percent) was severity wise, moderate anemia, while extreme anemia was rare. Compared with boys, the incidence of anemia was marginally higher among children, but not statistically significant (p>0.05). Age was strongly correlated with both anemia and mean haemoglobin (Hb) (p<0.05), but there was no substantial correlation with other demographic factors, including gender or parental education (p>0.05). **Conclusion:** Anemia is widespread among south India (Vikarabad) children in the current sample, and affects boys and girls equally. While it is very normal to have moderate anemia, it stays asymptomatic and therefore goes unnoticed and untreated.

Keywords: Anemia, Prevalence, Tertiary care hospital, South India

Introduction

Anemia, especially in developed countries, is a major global health concern. This crucial health problem has not yet been resolved and appears to impact the health, quality of life, and working capacity of billions of people worldwide [1]. WHO geographical figures for pre-school children and pregnant and non-pregnant women suggest that the highest concentration of affected individuals is in Africa (47.5-67.6 percent), while the largest number of affected individuals are affected in South-East Asia, where 315 million (95 percent CI: 291-340) individuals are affected in these three demographic groups. For preschool children (76.1 percent), pregnant (69 percent) and non-pregnant (73.5 percent) [2], the data coverage is around 70 percent or more. For the remaining demographic groups, coverage is even lower; 33% for children of school age, 40.2% for men, and 39.1% for the elderly. The coverage for the general public is 48.8 percent overall. [3] In comparison, the global prevalence of anemia is 25.4 percent in school-age girls, 12.7 percent in men and 23.9 percent in older adults. 89 million pre-school children in India suffer from anemia [4]. Malnutrition is the most prevalent group of causes of anemia and iron deficiency makes up the majority of it in that group. With adequate and prompt action, a substantial portion of iron deficiency is preventable. The world's most prevalent dietary condition is iron deficiency. The figures are staggering: two billion people, over 30 percent of the world's population, are anemic, primarily due to iron deficiency; and malaria and worm infections are

mostly worsened in developed countries [5]. Iron deficiency affects more patients, constituting a public health problem, than any other disease. In terms of ill-health, early mortality, and missed revenue, it exerts the highest cumulative toll. Since their bodies are still developing, including the brain, which is the fastest developing organ in infancy and early childhood, the effects of anemia on children are the most dire [6].

As far as we know, no such research on the prevalence of anemia in South India has been undertaken, so this study was done to understand the burden of disease in South India, which will help us raise consciousness among people about the problems of anemia and further management by health care providers.

Materials and Methods

The latest prospective research was carried out after the consent of the Ethical Committee of the Institute was received. This research was performed over a period of nine months in the paediatric outpatient department of a teaching hospital situated on a remote island in India (November 2018 to August 2019). The children (2-12 years of age) and their parents who attended the department of paediatric outpatient were told of the purpose and process of the research and of the voluntary importance of verbal and written involvement in the study.The children who recovered from mild illness after treatment were included for enrolment in the study. After describing the research purpose, informed written consent was obtained from each child's parents. Details regarding socio-demographic data was collected from the mother of the subject using a standardised pre-test questionnaire. Details were gathered about social status, family wealth, profession, parental schooling, birth order, birth interval, and number of siblings. Children who suffered from debilitating conditions were removed from the sample and those under 2 years of age and over 12 years of age. 526 children of

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any sex were counted in total. By a qualified phlebotomist, a 2 ml non-fasting blood sample was obtained from each infant from the antecubital vein into a heparinized Vacutainer. Within 4 hours of blood sampling, the serum was analysed. Using the fully automatic Mindray Hemat analyser-BC580000, a total blood count was calculated (Mindray Medical International Limited, Shenzen, China). Anemia was diagnosed in line with the amount of Hemoglobin (Hb) cut off by the WHO. Hb is <11g/dL for 6-59 months, <11.5g/dL for 5-11 years, and <12g/dL for 12-14 years. It was further graded as mild (if Hb-10-10.9g/dL for 6-59 months, 11-11.4g/dL for 5-11 years, 11-11.9g/dL for 12-14 years), reasonable (if Hb-7-9.9g/dL for 6-59 months, 8-10.9g/dL for 5-14 years), and serious (if Hb< 7 g/dLfor 6-59 months and < 8 g/dL for 5-14 years)[7]. The Chi square test was used to research the correlation between anaemia and different demographic factors. The mean Hb was compared using a single ANOVA test in various age groups and a p-value < 0.05 was found to be important. (EpiInfo 7.2.3.1 and orgin pro 8.0 Statistics tools).

Results

298 of the children (56.65 percent) were male and 228 were female (43.34 percent). The age group of 6-9 years has a higher proportion (36.50 percent) of girls. The children were classified into separate age groups: 2-6, 6-9, 9-12 and 12-16. In 56.32 percent, 42.52 percent and 1.14 percent, respectively, 174 (33.07 percent) children were anaemic and mild, moderate and extreme anemia were observed (Table.1).

Table 1: Frequency distribution of the participants' anemia and demographic factors

Variable	Group	Number (%)
Gender	Male	298 (65.65)
	Female	228 (43.34)
Age group	2-6	174 (33.07)
	6-9	192 (36.50)
	9-12	91 (17.30)
	12-16	69 (13.11)
Anemia	No Anemia	352 (66.92)
	Anemia	174 (33.07)
	Mild Anemia	98 (56.32)
	Moderate Anemia	74 (42.52)
	Severe Anemia	2 (1.14)
Education of Father	Illiterate	92 (17.49)
	Literate	434 (82.50)
Education of Mother	Illiterate	48 (9.12)
	Literate	472 (89.73)

The degree of sex-based anemia found that both mild and severe anemia was more common in girls (20.17% and 13.16%) compared to boys (17.45% and 14.76%), but there were no statistically meaningful variations (Table.2).

Table 2: Frequency of Anemia in participants in the study by gender

Gender	Anemia				Total
	No Anemia	Mild Anemia	Moderate Anemia	Severe Anemia	
Male	201 (67.45)	52 (17.45)	44 (14.76)	1 (0.33)	298 (100)
Female	151 (66.23)	46 (20.17)	30 (13.16)	1 (0.44)	228 (100)
Total	352 (66.92)	98 (18.63)	74 (14.07)	2 (0.38)	526 (100)

The highest prevalence of anemia was in the age range of 2-6 years (43.68 percent).There was a significant association of Anemia with age; P <0.01 (Table.3).

Table 3: Association between Demographic Variables and Anemia

Variable	Groups	Anemia		Total(n= 526)	Chi-square	P-value
		No anemia(n= 352)	Anemia(n= 174)			
Gender	Male	201 (67.45)	97(32.75)	298	0.0871	0.76
	Female	151 (66.23)	77 (33.77)	228		
Age group	2-6	98 (56.32)	76 (43.68)	174	28.03	0.05
	6-9	123 (64.06)	69 (35.94)	192		
	9-12	70 (76.92)	21 (23.08)	91		
	12-16	61 (88.40)	8 (11.60)	69		
Education of Father	Illiterate	78 (84.78)	14 (15.22)	92	16.07	0.00006
	Literate	274 (63.13)	160 (36.87)	434		
Education of Mother	Illiterate	31 (64.58)	17 (35.42)	48	0.233	0.628
	Literate	321 (67.69)	151 (32.31)	472		

Association between demographic variables and Anemia was tested using Chi-square test. The results indicates that age was significantly associated with the Anemia (p <0.01). The other demographic variables such as gender, education of father and education of mother are not significantly associated with the Anemia (p>0.05).

With respect to gender or parent education and the incidence of anaemia, no major variation was observed. The mean Hb was observed to be 10.59 ± 1.36g/dL and 9.96 ± 2.23g/dL, respectively, in boys and girls (Table.4).

Table 4: The comparison of Mean Hb (g/dL) values according to the various demographic characteristics in participants

Variable		Number (%)	Mean ± SD	P-value
Gender	Male	298 (56.65)	10.59 ± 1.36	0.115
	Female	228 (43.34)	9.96 ± 2.23	
Education of Father	Illiterate	92 (17.49)	5.92 ± 1.96	0.072
	Literate	434 (82.51)	11.26 ± 3.26	

Education of Mother	Illiterate	48 (9.12)	6.23 ± 1.92	0.05
	Literate	472 (89.73)	9.89 ± 1.89	

Comparison of Mean Hb (g/dL) values according to the various demographic characteristics using independent samples t-test. Gender, education of father and mother shows no significant difference in the mean Hb (g/dL) values (p>0.05).

Discussion

In the current research, the incidence of anemia was estimated at 32.21 percent in children aged 2-12 years. DeMaeyer*et al*. [7] reported that the global prevalence of anemia was 37 percent in children aged 5-12 years. In studies carried out in 271 children (7-14 years) in Asendabo city, Southwest Ethiopia [8], and in Vietnamese [9] school-age children, comparable values of 39.1 percent and 36.4 percent were recorded. In Morocco, a prevalence of 35% among rural school aged children was reported by Zimmermann *et al*.[9], while a high prevalence of 62.3% was observed among 3,595 school children from Pemla Island and Zanzibar[10,11]. The prevalence of anaemia is 52 percent in emerging countries and 22.5 percent in developed countries in pregnant women [12, 13]. India's multiple anemia incidence studies indicate values ranging from 41 percent to 66 percent [14-17]. In various studies, the differences in the prevalence of anaemia may be attributable to the variability of the population surveyed, dietary patterns, distinct nutritional status and occurrence of worm infestation in a given geographical region. In this study, the prevalence of anaemia was 43.9 per cent in the 2-4 age group and 30.9 per cent in the 4-6 age group. This is corroborated by the WHO survey of a prevalence of 47.4 percent in pre-school children worldwide, while the prevalence is estimated at 64.6 percent and 47.7 percent in Africa and Asia [3]. Iron deficiency anaemia impairs the concentration of teenage girls, lowers academic success, physical strength and self-efficacy, and raises the risk of infection. The prevalence of anaemia in India is 58.4 percent in children aged 6-59 months, according to the National Family and Health Survey-4 (performed during 2015-2016) results. That's 49% in the Andaman and Nicobar Islands (India) [23]. Low maternal iron reserves during pregnancy and lactation, accelerated development, delayed initiation of supplementary foods and poor dietary consumption of iron can be due to the higher incidence of Anemia in preschool children. Moderate and minor anaemia were the most frequent conditions, likely because mild and moderate anaemia is normally asymptomatic and can remain undetected and untreated [18,19]. This study found a greater incidence of anaemia in the age group of 2-4 years (43.9 percent), followed by 30.9 percent in the age group of 4-6 years.In a study carried out on rural preschool children in Maharashtra, a substantially higher prevalence of anemia was also identified in the 1-3 age group relative to the 3-5 age group[20]. In this study, the prevalence of anemia in males was 30 percent and 34.4 percent in females, marginally higher. In a study conducted on teenage school children in urban Kathmandu, Nepal, a similar higher prevalence (54.4 percent) of anemia in girls was reported [21]. A research on the prevalence of anemia in school children from Kattankulathur, Tamil Nadu, showed a higher prevalence of anemia in girls [22]. The higher prevalence reported in the above studies is due to subjects who had elevated iron requirements during the growth cycle in the adolescent age group and also had chronic menstrual blood loss. While the percentage of literacy among men and women is high at 84.1% and 88.5% respectively in these islands (National Family and Health Survey-4 data), the prevalence of anaemia among children is moderately high. The research by Sabale*et al*. and Verma*et al*. [21, 22] have also found related results with no substantial association between anaemia and parental literacy. Mean haemoglobin values between different age groups were substantially different (p<0.01), but no gender differentials were found in the current study [23].

This research was constrained by the fact that the general prevalence of anemia and its severity were stated in a descriptive study. This included only the children who during the research time visited the paediatric outpatient department and whose parents gave permission for enrollment. Secondly, no causal impact relationship could be identified, being a cross-sectional analysis. There was also no representation of chronically disabled children who may have compromised the values. Further studies are needed to explain the aetiology of anemia and effective treatments, including people's knowledge of diets high in iron, folate and other micronutrients.

Conclusion

The problem of anemia, especially mild and moderate anemia, is widespread among South Indian (Vikarabad) children. It should be more examined and effective health care management interventions should be launched that could help enhance the cognition and learning environment of children.

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