Prevalence of Anemia among Saudi children aged 6 months to 5 years in a low altitude Area, Aseer Region, Saudi Arabia

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Abstract

Background: Anemia among children represents a major public health problem all over the world, and particularly in developing countries. The aim of this study was to determine the magnitude of anemia in general, and microcytic hypochromic anemia in particular, among Saudi children aged 6 months to 5 years of age in Muhayel City and also to compare the prevalence according to children's age and gender.

Subjects and Methods: This was a retrospective study to explore the magnitude of anemia among children in Muhayel City, Aseer region which is located in the southwestern region of Saudi Arabia. The study was done in a government hospital. The study population included all children aged 6 months to 59 months seen in the emergency room (ER) and who underwent sampling for complete blood count for whatever the reason. Hemoglobin level (Hb), mean corpuscular volume (MCV) and mean corpuscular hemoglobin (MCH) were taken.

Results: The study included 1,033 children aged between 6 and 59 months with a mean of 27.81±13.9 months. More than half of them were males 683 (66.1%). The prevalence of anemia was 29.3%; mostly mild 254 (24.6%) or moderate 48 (4.6%). Severe anemia was observed only in 1 child representing 0.1% of the sample. Microcytic hypochromic anemia was observed among 36.0% of the study sample, based on the WHO cut off levels of MCV and MCH.

Conclusion: Anemia, particularly microcytic hypochromic anemia is relatively still a public health problem among children in Saudi Arabia, despite the improvement in socio-economic status. Further research is recommended for deep investigation of the underlying factors, particularly nutritional habits.

Key words: anemia, microcytic, hypochromic, preschool, Saudi Arabia

Introduction

The World Health Organization report (1993-2005) revealed that children of preschool age represent 47.4% of anemic patients worldwide, [1] which represents a major public health problem all over the world, and in particular in developing countries.[1-3]

The most common cause of anemia is nutritional due to deficiency of some micronutrients such as iron, folate, vitamin B12, and protein.[4]

Most anemia cases develop gradually and progressively and are due to iron deficiency. In early childhood bad feeding habits, especially during the weaning period, exacerbate the problem. Anemia frequently develops as breast milk is replaced by foods that are poor in iron and other nutrients, including vitamin B12 and folic acid. Low oxygenation of brain tissues, a consequence of anemia, may lead to impaired cognitive function, growth and psychomotor development, especially in infants. Children under five years old and pregnant women have greater susceptibility to anemia because of their increased iron requirements due to rapid body growth and expansion of red blood cells.[5-8]

Preschool children have the highest risks of anemia as a result of their physiological vulnerability and greater liability of infection.[9] Iron deficiency is the main type of anemia among preschool children[10] and is primarily due to increased iron requirements as they grow.[11] Moreover, iron is likely to be inadequate in children's diets, particularly if parents are unaware of the need for iron intake.[5-12]

Anemia has adverse outcomes on the health of preschool children, including impacts on cognitive development, physical growth, immunity and school performance.[13,14]

As the prevalence of anemia in Saudi preschool children has not been recently studied and because of the rapid economic changes in the Kingdom of Saudi Arabia in socioeconomic and lifestyle of the Saudi community in recent decades, this study was carried out to determine the prevalence of anemia in preschool age children in Muhayel - a low attitude area- and also to compare the prevalence between different age groups; 6-23 months to 24-48 months and to 49-59 months, as well as to determine the prevalence of microcytic hypochromic anemia among the whole group based on MCV and MCH and for different subgroups.

Subjects and methods

This was a retrospective hospital record-based study done at Muhayel in Aseer region which is located at the southwestern region of Saudi Arabia. This study was done in the government hospital in the low altitude area. The study population included all children aged 6 months to 59 months seen in the emergency room (ER) between 1 January 2018 to 31 December 2018 and who underwent sampling for complete blood count for whatever the reason. Exclusion criteria were all patients with sickle cell anemia, thalassemia, those with acute blood loss or hemolysis, and those with chronic diseases such as chronic kidney, liver diseases or chronic cyanosis.

Data about child age, sex and area of living were collected from the ER records which usually contain all personal data about patients and acute diagnosis and underlying disease if present. Hemoglobin level (Hb), mean corpuscular volume (MCV) and mean corpuscular hemoglobin (MCH) were taken. Hemoglobin of patients from high altitude areas were subtracted by 0.8 mg as per WHO recommendation.[15]

Normal values for hemoglobin was >= 11 gm/dl, 10-10.9 gm/dl was considered as mild anemia, 9.9- 7 gm/dl was considered moderate anemia and <7 gm/dl was regarded as severe anemia. Regarding MCV, low level was defined as the following: 6 months - 24 months < 70; 25 months - 48 months <73 and 49 - 59 months <75 and for MCH, low is defined as the following: 6 - 24 months <24 and 25 - 59 months < 25.[15]

Results

This study utilized data from 1,033 Saudi children in the age group of 6-59 months across Muhayel City, Aseer Region of Saudi Arabia. From a total of 1,033 children, 683 (66.1%) of them were males and 350 (39.9%) were females as shown in Table 1.

Table 2 shows the demographic factors associated with anemia among the selected Saudi children for this study, in different age groups. From the 567 children 6-24 months, a number of 185 (32.6%) experienced mild anemia, 40 (7.1%) experienced moderate anemia and only 1 (0.2%) child experienced severe anemia.

Multivariate analysis showed the children between 25 months to 48 months of age had a lower risk of having anemia. A number of 60 children (16.1%) had mild anemia, 5 children (1.3%) had moderate anemia and none of them had severe anemia.

Children more than 48 months of age had the lowest risk of having anemia with 9 children (9.7%) who suffered mild anemia, 3 children (3.2%) who suffered moderate anemia and none suffered severe anemia.

Out of the 1,033 Saudi children 6-59 months of age, most of them did not have anemia (730 children, 70.66%), 254 (24.57%) children experienced mild anemia and 48 (4.64%) children had moderate anemia. Only 1 (0.09%) child suffered severe anemia.

In terms of gender, there were more male children who had anemia (683 males, 66.1%) compared to female children (350 females, 33.9%)

Figure 1 shows the prevalence of microcytic hypochromic anemia among the selected participants in Muhayel. A total of 620 children had microcytic anemia, 575 had hypochromic anemia, and 373 had microcytic hypochromic anemia.

Table 1: Demographic characteristics of the Saudi Children (participants)

Variables	Categories	Frequency	Percentage
Age (in months)	6-24	567	54.9
	25-48	373	36.1
	>48	93	9.0
Gender	Males	683	66.1
	Females	350	39.9

Table 2: Demographic factors associated with anemia among Saudi children 6-59 months in Muhayel, Aseer Region of Saudi Arabia. (N = 1,033)

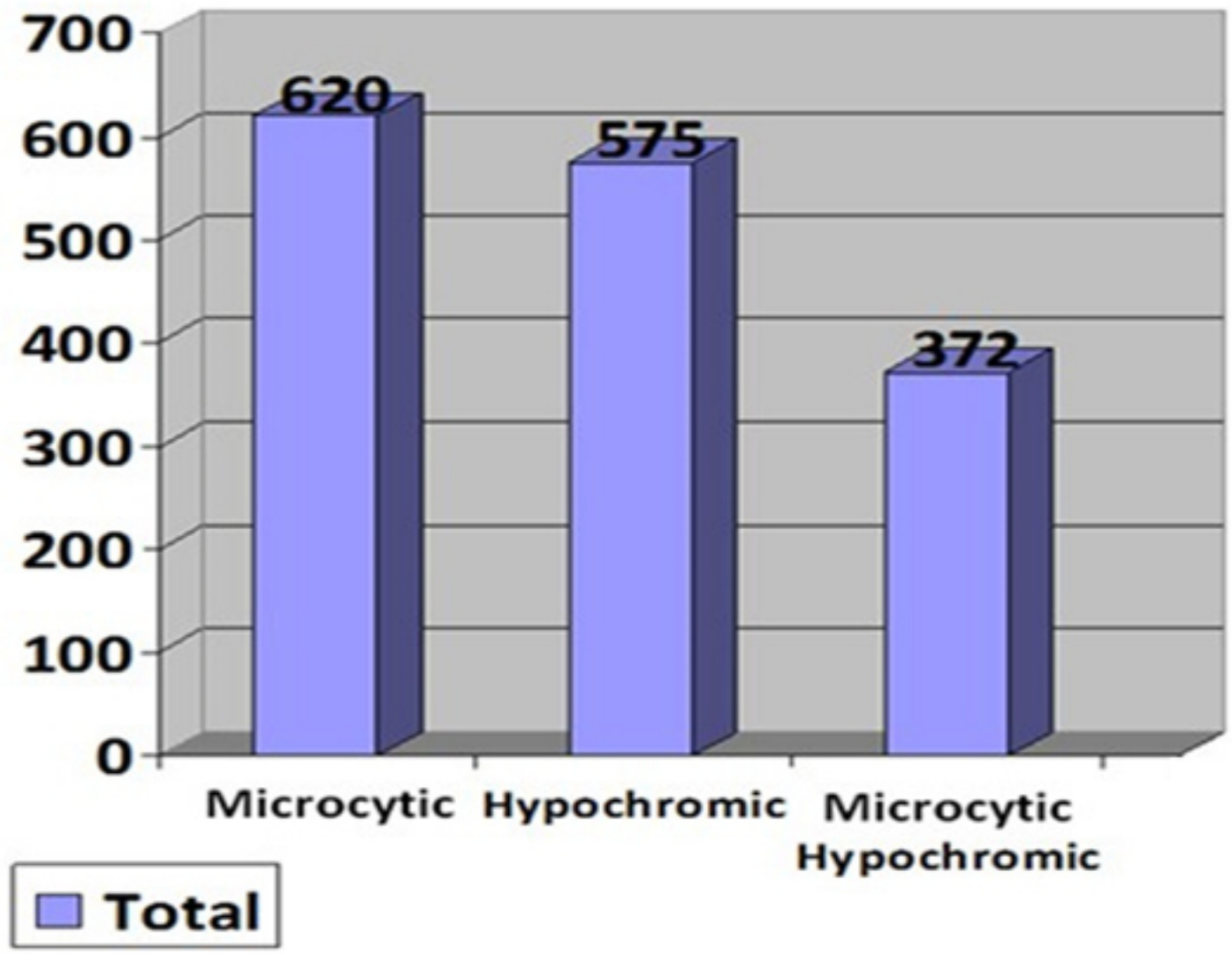
	Anemia*				χ^2 (p-value)
	No N = 730 N (%)	Mild N = 254 N (%)	Moderate N = 48 N (%)	Severe N = 1 N (%)	
Age in months					
6-24 (n=1253)	341 (60.1)	185 (32.6)	40 (7.1)	1 (.2)	
25-48 (n=779)	308 (82.6)	60 (16.1)	5 (1.3)	0 (0)	0.000
>48 (n=383)	81 (87.1)	9 (9.7)	3 (3.2)	0 (0)	
Gender					
Males (n=1446)	483 (70.7)	165 (24.2)	34 (5.0)	1 (0.1)	.764
Females (n=969)	247 (70.0)	89 (25.4)	14 (4.0)	0 (0.0)	

* Based on WHO hemoglobin concentration cut off levels

Table 3: Demographic factors associated with microcytic hypochromic anemia among children 6-59 months, Abha and Khamis Mushayt cities, Saudi Arabia. (N = 1,033)

	Microcytic hypochromic anemia*		χ^2 (p-value)
	Yes (N=661) (%)	No N= 372 (%)	
Age in months			
6-24 (n=1253)	238 (42.0)	329 (58.0)	
25-48 (n=779)	238 (30.3)	260 (69.7)	.000
>48 (n=383)	21 (22.6)	72 (77.4)	
Gender			
Males (n=1446)	250 (36.6)	433 (63.4)	.314
Females (n=969)	122 (34.9)	228 (65.1)	

Figure 1: Prevalence of microcytic hypochromic anemia among children 6-59 months in Muhayel City, Aseer Region of Saudi Arabia



Discussion

This study was undertaken to determine the magnitude of anemia among Saudi Arabia children aged 6 months to 5 years in Muhayel, Aseer Region of Saudi Arabia. Anemia was found among 29.33% of children. This is comparatively lower than the national prevalence which is 44% according to the EDHS findings in 2011.[16] Prevalence of anemia varied as reported from several developing countries. In 2008, it was 16.1% in the Philippines.[17] Another study in Tanzania showed it was 87%.[18] This level of prevalence is classified as a moderate public health problem according to the World Health Organization.[19] The observed magnitude of anemia in our study was lower than the estimated global anemia prevalence which is 47.4%.[20]

It is evident in this study that occurrence of anemia varied with age. The occurrence of anemia in children 6 months to 24 months is the highest. The magnitude of the problem in children aged 24 months and below may be associated with increased demand of iron due to fast growth, early weaning and scarcity of foods rich in iron. Iron intake is also likely to improve with age as a result of more varied diet, including the introduction of food rich in iron.[21] These factors are usual in this age group. Neves who studied anemia in children 6-24 months of age in Belem, and Para in Brazil found a prevalence of 55.1%.[22] In this study, 226 (39.85%) children had anemia which is higher than in those aged 48 months and above (12 children, 12.90%). This result is similar to study findings conducted in Ethiopia (2007), Brazil (2010), and Bangladesh (2010).[23-25] Another study conducted by Magalhaes in Africa reported the same trend of anemia prevalence by age.[10]

The observed magnitude of anemia in this study decreased with children's age. It decreased among children aged 25 months to 48 months (65 out of 373, 17.42%). A study conducted in Nigeria had the same result. [26] This may be associated with lower iron requirements per kilogram of body weight related to decreasing growth rate and the shifting from complementary foods to table foods [17, 26, 27].

In this study one of the factors associated with anemia is the gender. More male children (66.1%) acquired anemia compared to female children (39.9%). Other authors also reported that anemia is more common in boys. [28 , 29] It may be because boys grow faster compared to girls which results in a high demand of iron that cannot be met by diet alone. A comparable observation was made in African countries like Ghana and Malawi.[30 - 32] Some authors found in their studies that there is no association between anemia and gender.[33 - 34] However, further studies are necessary to better understand the relationship between anemia and gender.

An important limitation of the present study is that the study population included children visiting the ER at a hospital. This may reduce the generalizability of the results. Nevertheless, results of this study can generate ideas to develop interventions that can combat anemia. The government should focus on providing information about adequate nutrition among children. The results emphasize the importance of evaluating the overall nutritional status of the participants. Interventions like iron supplementation and nutritional education should be encouraged to decrease the prevalence of anemia in children 6 months to 5 years of age.

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Conflicts of interest: none

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