Epidemio-Demographical Study of Anemia in School: Aged groups

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Abstract

Background: Anemia is a significant global health problem affecting children and reproductive-age women and it is defined as a reduction of the hemoglobin concentration or red blood cell (RBC) volume below the range of values occurring in healthy persons.

Material and method: The current study was cross-sectional study done in AL-Alam general hospital, we take 500 children and adolescences and the age restricted from 6year to 18 year, the cases taken in the pediatric outpatients department regardless whether sick or healthy children or adolescences we take the history from the cases depending on the signs and symptoms of anemia. Data were analyzed by using the Windows program The data was summarized firstly in single master table manually . The Chi square test was used to determine whether significant differences occurred among the groups and where they occurred.

Results: we find about 33.60% of cases were anemic including IDA ,and 25.96% was mild anemia this mean anemia highly prevalent , and mainly at adolescents age group about(50%),also we find anemia more prevalent in rural area(42.5%) than urban area(32.2%) may be to low socioeconomic status in rural area, also the prevalence of anemia was more in not student cases(40.47%) and high level of anemia in illiterate father and mother this indicate the educational status important to parent and children to awareness about anemia and healthy food consumption.

Conclusion: Anemia highly prevalent in our area and more in rural area than the urban area and more in adolescent age group.

Keywords: Epidemio ; demographical ;Anemia ; school -Aged groups

Introduction

Anemia is a significant global health problem affecting children and reproductive-age women and it is defined as a reduction of the hemoglobin concentration or red blood cell (RBC) volume below the range of values occurring in healthy persons. "Normal" hemoglobin and hematocrit (packed red cell volume) vary substantially with age and sex[(1)]. Quantitatively defined as any hemoglobin or hematocrit value that is two standard deviations (SDs) (95%confidence limits)below the mean for age and gender[(2)].

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Anemia is a major public health problem in the world wide with prevalence of 43% in developing countries and 9% in developed nations[3]. It is widespread in individuals at any stage of life, although pregnant-reproductive women and young children are most susceptible, which may increase the risk of impaired cognitive and physical development and increased mortality and morbidity rate[4]. The World Health Organization (WHO) has estimated that more than 2 billion people worldwide are suffering anemia with 50 % of all anemia was attributed to iron deficiency[5]. Despite its multifactorial etiology, anemia might be nutritional (iron, folic acid, and vitamin B12), inherited (thalassemia and sickle cell), environmental pollutants (lead), infectious (malaria), socioeconomic (low maternal level of education and low household income), demographic factors (age and gender), autoimmune (hemolytic anemia), malabsorption (achlorhydria), and chronic (cancer); iron deficiency anemia IDA is the most common cause of anemia[6].

Despite the high prevalence and serious consequences of anemia, there have been few reported studies assessing the effectiveness of anemia prevention and control programs in developing countries. Prevention and control of anemia is essential to reduce its consequences which further require effective treatment, and management of patients. Likewise, effective diagnosis of anemia is the main avenue for proper treatment and management of anemic patients[7,8].

Anemia in children is influenced by structural and environmental factors, community, household factors, and individual's health and nutritional level. Anemia in pre-school children has a negative effect on cognition, motor development and growth, academic performance, immunity, and susceptibility to infections[9]. These threats to health in earlier life are determinants of other health problems in later life[10].

Aims of the study:

1. Identify the prevalence of anemia.
2. Recognize the percentage of anemia category groups according to severity.
3. Identify the prevalence of iron deficiency anemia.
4. Recognize the percentage of iron deficiency anemia category groups according to the severity.and study the association between some demographical factors and the occurrence of anemia including iron deficiency anemia.

Subjects:

The current study was a cross-sectional study done in AL-Alam general hospital, we take 500 children and adolescences and the age restricted from 6year to 18 year, the cases taken in the pediatric outpatients department regardless whether sick or healthy children or adolescences we take the history from the cases depending on the signs and symptoms of anemia, if there is any tiredness, fatigue, tachycardia, shortness of breath, cold hands and feet, chest pain, poor appetite, behavioral problems, dizziness, history of pica in children(the desire to ingest nonnutritive substance), and pagophagia (desire to ingest the ice). and we ask about educational level for the both parents for searching if there is any relation with anemia also ask about place of living whether rural or urban area , after that we examine the case for any sign of anemia like pallor of skin, conjunctiva, lower aspect of the tongue, palm or sole. Also we examine the nails for refilling sign if more than 2 second mean anemia and looking for koilonychias(spoon nail) which indicated for iron deficiency anemia and we examine the abdomen for organomegaly which present in non iron- deficiency anemia and the heart for any presence of murmur which indicate severe anemia after that we send the child or adolescence for investigation.

Investigations: CBC;. S.Ferritin; blood film; retic count (for noniron deficiency anemia); Hb electrophoresis (for noniron deficiency anemia) and TSB(total serum bilirubin) (for noniron deficiency anemia)

Statistical analysis:

The data was summarized firstly in single master table manually ,then according to the aim of study the data categorized into small tables which is help us to calculate the association between anemia and demographical factors by using Chi- square test and odd ratio and using P value table to reveal the significance difference between the variables.

Results

Identify the prevalence of anemia in school-aged group.

In our study, we take 530 cases restricted by 6-18 years old taking randomly in the pediatric and medicine department and we find about 33.60 % of cases were anemic including IDAIn our study, we take 530 cases restricted by 6-18 years

Table (1): prevalence of anemia in school-aged group.

	Not anemic No.(%)	**Anemia(including IDA) No.(%)**	**Total**
No.	334(66.40%)	196(33.60%)	530

Recognize the percentage of anemia category groups according to the severity.

In this table we classified the anemic patients including IDA according to the severity and we depending on WHO classification [11] and we find mild anemia (55.85%) more than the moderate and severe anemia

Table (2): percentage of anemia category groups according to the severity.

Anemia(including IDA) severity groups	**Mild No.(%)**	**Moderate No.(%)**	**Severe No.(%)**	**Total**
No.(%)	119(59.86%)	65(25.96%)	12(14.18%)	196

Identify the prevalence of iron deficiency anemia:

In this table, we take only IDA to estimate the prevalence of it in the school age group and we find that there is about 23.96% of cases are IDA regardless the age and gender as mentioned in table 3. so in the same table we take IDA and classified according to severity depending on WHO classification of[11] and we find the mild anemia(45.**67%)** more than the other anemia.

Table (3): Identify the prevalence of iron deficiency anemia and percentage of iron deficiency anemia category groups according to the severity.

Hb	**Not anemic+anemia but not IDA No.(%)**	**IDA No.(%)**	**Total No.(100%)**	
No.(%)	403(76.04%)	127(23.96%)	530	
IDA severity groups	**Mild No.(%)**	**Moderate No.(%)**	**Sever No.(%)**	**Total No.(100%)**
No.	64(50.40%)	58(45.67%)	5(3.93%)	127

Study the association between some demographical factors and the occurrence of anemia and iron deficiency anemia.

Prevalence of anemia including IDA in relation to the age groups.

In this table we study the prevalence of anemia in different age groups and we find the anemia including IDA more in primary school and adolescent than the other age groups and this study give us a significant relation, As well as In this table we reveal the prevalence of anemia including IDA in relation to gender and the study gave us this results 36.2% of anemic cases were females while 35.9% of anemic cases were male and so the study not significant *P* value >0.05 and the chi square =0.0045.

Table (4): Association between anemia; iron deficiency anemia and age with gender.

Age	Not anemic No.(%)	Anemic (including IDA) No.(%)	Total No.(100%)
6-7	53(62.3%)	32(37.6%)	85
8-9	95(64.1%)	53(35.8%)	148
10-11	117(73.5%	42(26.4%)	159
12-13	32(55.1%)	26(44.8%)	58
14-15	37(50%)	37(50%)	74
16≤	5(83.3%)	1(16.6%)	6
Total	339	191	530
The value of chi square test X^2 is 15.66, *P* value < 0.05 Result: Significant			
Gender			
Male	143(64.1%)	80(35.9%)	223
Female	196(63.8%)	111(36.2%)	307
Total	339	191	530
The value of chi square test X^2 is 0.0045, *P* value >0.05 . Result: Not significant			

prevalence of anemia including IDA in relation to many risk factors:

In this study we take the anemic patients including the IDA in relation to study status and we find the anemia in non-students (50%) more than anemia in student patients (34.83%) the chi square test =3.8578 and the *P* value <0.05 so the study significantIn this table we find the number of anemic patients in urban area more than the number of anemic patients in rural area ,so that the chi square test =5.488 and the *P* value <0.05 so the study significant .

In this object we take the anemia including IDA in relation with father education and we find the anemia more in not educated father and those just read and write not admitted to the school so this study reveals a significant relation between the anemia and the level of education, as well as in this study, we take cases with anemia including IDA in relation to mother education and we find the number of cases with not educated mothers more than the other cases with educated mothers so that there is the relation between the anemia and mothers education .

Table (5): Prevalence of anemia including The IDA in relation to residence ,study status, father and mother education.

Location	Not anemic N0.(%)	Anemic N0.(%) (including IDA)	Total No.(100%)
Urban	223(67.8%)	106(32.2%)	329
Rural	116(57.8%)	85(42.2%)	201
Total	339	191	530
value of chi square test X^2 is 5.4887, P value <0.05, Result: Significant.			
Student ?	**Not anemic No.(%)**	**Anemic No.(%) (including IDA)**	**Total No.(100%)**
Yes	318(65.2%)	170(34.8%)	488
No	21(50%)	21(50%)	42
Total	339	191	530
value of chi square test X^2 is 3.8578, P value <0.05. Result: Significant			

Father education	Not anemic N0.(%)	Anemic N0.(%) (including IDA)	Total No.(100%)
Not read not write	11(40.8%)	16(59.2%)	27
Read and write	11(34.4%)	21(65.6%)	32
Primary	248(68.9%)	112(31.1%)	360
Intermediate	26(50.9%)	27(49.1%)	53
Secondary	11(100%)	0	11
More	32(68.1%)	15(31.9%)	47
Total	339	191	530
value of chi square test X^2 is 33.91,P value < 0.05. Result: Significant			
Mother education			
Not read not write	57(41.3%)	81(58.7%)	138
Read and write	32(60.4%)	21(39.6%)	53
Primary	169(72.6%)	64(27.4%)	233
Intermediate	58(78.4%)	16(21.6%)	74
Secondary	0	0	0
More	23(71.9%)	9(28.1%)	32
Total	339	191	530
value of chi square test X^2 is 45.99, P value <0.05, Result: Significant.			

Discussion

Anemia is one of the major public health problems affecting more than half of school-age children in developing countries. Anemia among children has been conclusively seen to delay psychomotor development, poor cognitive performance, impaired immunity and decrease working capacity[11].

In current study we find that the prevalence of anemia including IDA about (33.60%) of cases but in another study of Sunil Pal Sing C[12]. found that the prevalence of anemia was (52.7%). This high percent of anemia in our study suggesting that anemia is a public health problem among the school-aged children in the area. And we find mild anemia more than the moderate and severe anemia.

The prevalence of anemia in our study is higher than those similar studies reported from different areas like, Egyptian children 12%[13], among school-age children in Kenitra Morocco 12.2%[14] and among Sanliurfa, South-east Turkish children 5.4%[15]. This variation might be due to low socioeconomic status and lower nutritional status of school-aged children in this study area than those reported from elsewhere.

We reported high prevalence of anemia including IDA in adolescent age group (50%) like a study in India Chandrakumari, Abilash Sasidharannair[16] the overall prevalence of anemia was 48.63%, which reflects upon the burden of anemia in a rural setting among a group of adolescent girls and like a study of P. Goyal, V. Potdar, and R. Reddy[17] the prevalence of anemia in adolescent (45.3%) this mean This variation might be due to the adolescence is the period of rapid growth marked by physical and mental transition. During this period, an individual undergoes emotional, sexual, social, and educational problems; in addition, unhealthy dietary habits and low socioeconomic background make them vulnerable to diverse nutritional morbidities. Of these various nutritional problems, anemia surpassed other conditions among adolescent girls in the developing countries[18].

We reported in our study that the prevalence of anemia including IDA was (36.15%) in females and (35.87%) in males while in another study in India the results of the study showed that 52.88% were anemic, the prevalence of anemia in girls (67.77%) was higher than in the boys (35.55%)[19]. this mean our study not significant in relation to other study.

On the other hand we find that anemia including IDA was more in rural area(42.28%) than the urban area (32.21%) its similar to a study of Al-kassab-Córdova A, Mendez-Guerra C.[20] In rural areas, the prevalence was 38.25%, where as in urban areas it was 26.39% . this prevalence of anemia in rural area may be due to poverty and low socioeconomic status. Also similar to a study carried out in AL-Yemen[21] the prevalence of anemia in rural area was(51.3%) and in urban area was(32.2%).

The current study reveal that the prevalence of anemia including IDA was more in not student children and adolescents (50%) than anemia including IDA in students children and adolescents(34.83%) this indicate that the level of education important in a knowledge of a healthy eats and important ways to prevent become anemic also its indicate the educational level of mother and father very important in treatment and prevention of anemia.

In our study we find the prevalence of anemia including IDA was high in children and adolescents with not educated or low educated father(59.25%) similar to a study carried in Egypt[22] the prevalence was (58.9%) and also we find that the prevalence of anemia including IDA was high in reported cases with illiterate or low educated mother this indicate there is a significant relation between paternal education and prevalence of anemia also similar to a study done in Northwest Ethiopia that reveals the prevalence of anemia high in illiterate fathers (39.5%) and illiterate mothers (42.7%)[23]. Children who had illiterate mothers were more likely to be anemic compared to children whose mothers were literate. A similar study conducted in Kenitra Morroco[24] also showed that anemia was significantly associated with mother education. Low level of mothers' education may affect children's nutritional status negatively. This might be related to lack of knowledge and awareness on the use of diversified diets including iron and other micronutrients.

Conclusions

1. The prevalence of Anemia including IDA was noticeable increased in the area of study (33.60%).also anemia including IDA was more prevalence in all age group but more in adolescent 14-15 years old.
2. Anemia including the IDA was significant increase in rural area than urban area
3. Anemia more significant in not student cases., so fathers and mothers education was important in decreasing the prevalence of anemia in school age children and adolescents.

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References

1. ROBERT M. KLIEGMAN, MD,JOSEPH W. ST GEME III, MD, NATHAN J. BLUM, MD. Nelson text book of pediatrics ,21th edition.2020.
2. Karen J.Marcdante.,Robert M.Kliegman.Nelson essentials of pediatrics , seven edition .2015.
3. Habibzadeh F. Anemia in the Middle East. Lancet. 2012;379(1).
4. Khaskheli M.-N., Baloch S., Baloch A. S., Baloch S., Khaskheli F. K. Iron deficiency anaemia is still a major killer of pregnant women. Pakistan Journal of Medical Sciences. 2016;32(3):630–634. doi: 10.12669/pjms.323.9557.
5. WHO (2011). Hemoglobin concentrations for the diagnosis of anemia and assessment of severity. Vitamin and mineral nutrition information system. Geneva: World Health organization.
6. Al-Zabedi E. M. Prevalence and Risk Factors of Iron Deficiency Anemia among Children in Yemen. American Journal of Health Research. 2014;2(5):p. 319. doi: 10.11648/j.ajhr.20140205.26.
7. Iron deficiency anemia WHO/UNICEF/UNU. Assessment, prevention, and control. Geneva: World Health Organization; 2001.
8. WHO, UNICEF, UNU. Iron deficiency Anemia: assessment, Prevention and Control, A Guide for Program Managers, WHO, UNICEF, UNU, Geneva, Switzerland,2001.http://www.who.int/nutrition/publications/micronutrients/anaemia_iron_deficiency/WHO_NHD_01.3/en/index.html.
9. Sanou D, Ngnie-Teta I. Risk factors for anemia in preschool children in sub-Saharan Africa. In: Donald S, editor. Anemia. (2012).
10. 4. World Health Organization. Children's Health and the Environment Annual Report – 2010. Geneva, USA: World Health Organization (2010).

11. Bekele Gutema,corresponding author Wondimagegn Adissu, Yaregal Asress, and Lealem Gedefaw, Anemia and associated factors among school-age children in Filtu Town, Somali region, Southeast Ethiopia, BMC Hematol. 2014; 14: 13. Published online 2014 Aug 18. doi: 10.1186/2052-1839-14-13.
12. Sunil Pal Singh C., Prevalence of nutritional anemia in primary school children in urban slums area of Hyderabad,Andhra Pradesh ,India, British Biomedical Bulletin,2014.
13. Barduagni P, Ahmed AS, Curtale F, Raafat M, Mansour E. Anemia among school children in Qena Governorate, Upper Egypt. East Mediterr Health J. 2004;10(6):917–919.
14. El Hioui M, Ahami AO, Aboussaleh Y, Rusinek S, Dik K, Soualem A, Azzaoui FZ, Loutfi H, Elqaj M. Risk Factors of Anemia among rural school Children in Kenitra, Morocco. East Afr J of Public Health. 2008;5(2):62–66.
15. Koc A, Kosecik M, Vural H, Erel O, Atlas A, Tatli MM. The frequency and etiology of anemia among children 6–16 years of age in Sauth-east region of Turkey. Turk J Pediatr. 2000;42:91–95.
16. Chandrakumari, A. S., Sinha, P., Singaravelu, S. & Jaikumar, S. Prevalence of Anemia Among Adolescent Girls in a Rural Area of Tamil Nadu, India. Journal of family medicine and primary care 8, 1414–1417, https://doi.org/10.4103/jfmpc.jfmpc_140_19 (2019).
17. P. Goyal, V. Potdar, and R. Reddy, "Hematological profile of nutritional anemia among adolescent girls in rural area around karad, District- Satara, Maharashtra," Journal of Medical Science and Clinical Research, vol. 4, no. 12, 2016.
18. Shekhar A. The iron status of adolescents girls and its effect on their physical fitness. Indian J Nutr Diet 2005;42:451-6.
19. B Sudhagandhi1, Sivapatham Sundaresan2, W Ebenezer William1, A Prema3, Prevalence of anemia in the school children of Kattankulathur, Tamil Nadu, India, year : 2011 | Volume : 1 | Issue : 2 | Page : 184-188.
20. Al-kassab-Córdova A, Mendez-Guerra C, Quevedo-Ramirez A, Espinoza R, Enriquez-Vera D, Robles-Valcarcel P. Rural and urban disparities in anemia among Peruvian children aged 6-59 months: a multivariate decomposition and spatial analysis. Rural and Remote Health 2022; 22: 6936.
21. Al-Jermmy, A.S.M.; Idris, S.M.; Coulibaly-Zerbo, F.;Nasreddine, L.; Al-Jawaldeh, A. Prevalence and Correlates of Anemia among Adolescents Living in Hodeida, Yemen. Children 2022, 9,977.
22. R. A Salama, K. El Aini, Prevalence of anemia among informal primary school children: a community based study in rural Upper Egypt: Epidemiology Biostatistics and Public Health - 2016, Volume 13, Number 1.
23. Birhanu M, Gedefaw L, Asres Y. Anemia among School-Age Children: Magnitude, Severity and Associated Factors in Pawe Town, Benishangul-Gumuz Region, Northwest Ethiopia. Ethiop J Health Sci. 2018 May;28(3):259-266. doi: 10.4314/ejhs.v28i3.3. PMID: 29983525; PMCID: PMC6016356.
24. Hioui M, Ahami A, Aboussaleh Y, Rusinek S, et al. Risk factor of anemia among school age children in Kenitra Morocco. *East Afr J Public Health.* 2008;5(2):62–66.