

Assessment of Severity of Anemia Among Children Under 5 Years

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المستخلص:

الهدف: تهدف الدراسة إلى تقييم شدة فقر الدم بين الأطفال دون سن خمس سنوات ومعرفة العلاقة بين شدة فقر الدم عند الأطفال والمتغيرات الديموغرافية مثل (جنس الطفل، عمر الطفل، التغذية الإضافية، الإصابة بالديدان، الوبم (القطا)، المستوى التعليمي للأبوين، مهنة الأب والأم والدخل الأسري الشهري).

المنهجية: دراسة مقطعية متقاطعة وصفية أجريت في مراكز الرعاية الصحية الأولية في مدينة الصدر للفترة من الأول من حزيران ٢٠١١ ولغاية الأول من تشرين الأول ٢٠١١. تم اختيار عينة غرضية "غير احتمالية" ل(٦٣٠) طفل والذين أعمارهم أقل من خمس سنوات ويراجعون مراكز الرعاية الصحية الأولية في مدينة الصدر. جمعت المعلومات من خلال استعمال استبانة مصممة ومكونة من جزئين، الجزء الأول يتضمن المعلومات الديموغرافية للطفل وأسرته صممت تملئ بطريقة المقابلة والجزء الثاني يتكون من مستوى الهيموغلوبين في الدم. تم تحديد الثبات للاستبانة من خلال الدراسة الاستطلاعية وحددت مصداقيتها من خلال الخبراء. تم تحليل البيانات من خلال استعمال الإحصاء الوصفي الذي تضمن التكرارات والنسب المئوية وكذلك استعمال الإحصاء الإستنتاجي الذي شمل الانحدار المنطقي المتعدد.

النتائج: أشارت نتائج الدراسة أن (٦٩٪) من الأطفال يعانون من فقر دم بشكل عام و (٣٥٪) منهم يعانون من فقر دم متوسط، (٣١٪) يعانون من فقر دم بسيط و(٣٪) يعانون من فقر دم شديد. أشارت نتائج الدراسة وجود علاقة معنوية بين شدة فقر الدم والتغذية الإضافية والدخل الشهري والمستوى الدراسي للأم. فضلاً عن ذلك، لا توجد علاقة معنوية بين شدة فقر الدم عند الأطفال وبنسب الجنس والطف، الإصابة بالديدان، المستوى التعليمي للأب ومهنة الأب والأم.

التوصيات: يوصي الباحثان بتطبيق برنامج تحري عن فقر الدم وتحديد شدة فقر الدم وخاصة بعمر أقل من ٥ سنوات وزيادة توعية المجتمع عن مخاطر فقر الدم وخاصة فقر الدم الشديد عند الأطفال.

Abstract:

Objective(s): The aim of this study was to assess the severity of anemia among children under 5 years and to find out relationship between severity of anemia in children with socio-demographic variables such as: child gender, age, supplement diet, hookworm, pica, parent's education level, father's and mother's occupation, and family monthly income with severity of anemia

Methodology: A descriptive cross sectional study was conducted at the primary health care centers in Alsadr city for the period of 1st July 2011 to the 1st November 2011. Non probability (purposive) sample of (630) children who aged under 5 years and who attended to primary health care centers of Alsadr city. The data were collected through using special constructed questionnaire designed, which comprises two parts. Part one consists of child's demographic characteristics and their families filled by using interview technique and part of two consist hemoglobin level. The reliability of the questionnaire was determined through a pilot study and the validity through a panel of experts. The data were analyzed through the application of descriptive statistic frequency, percentage, and the application of inferential statistical procedures, which multiple logistic regressions

Results: The results of the study indicated that (69%) of children have anemia in general, and (35%) of them have moderate anemia, (31%) of them have mild anemia and (3%) of them have severe anemia. The results of the study indicated there is significant relationship between severity of anemia with supplement diet, pica, mother's education and family monthly income. Moreover, there is no significant association between severity of anemia in children and (child's gender, child's age, infection worms, father's education level, parents' occupation).

Recommendations: The researchers recommend the application of screening program for anemia and determine the severity of anemia, especially children under 5 years and increase community awareness about the dangers of anemia especially sever of anemia in children

Keywords: Assessment, Severity of Anemia, Children

Introduction:

Anemia is defined as a hemoglobin level of less than the 5th percentile for age (1). RBC are responsible for carrying oxygen (O₂) to all the organ of the body system by a protein called hemoglobin (Hb) and when there are inadequate of RBC and Hb the body's cell are deprived and do not receive enough of O₂ (2) (3). Anemia can be classified according to the morphology or by etiology or it is classified as microcytic, normocytic, or macrocytic, based on the mean corpuscular volume. Anemia has sub classified into normal, mild, moderate, and severe levels based on the level of hemoglobin or clinical signs skin pallor table (1) (3-4).

Table 1. Classification of severity anemia by Hb level

Severity	Range
Normal	More than 11g/dl
Mild	10-10.9 g/dl
Moderate	8-9.9 g/dl
Severe	Less than 8 g/dl

g/dl:Gram per deciliter

Anemia is the world's second leading cause of disability and thus, it is one of the most serious global public health problems. It affects over half of preschool children and pregnant women in developing countries and at least 30-40% in industrialized countries (5).

Evidence indicates that anemia is associated with serious negative health consequences such as impaired performance on a range of mental and physical factors in children including physical coordination and capacity, mental development, cognitive abilities and social and emotional development and language development. Severe anemia (Hb less than 5 g/dL) is associated with an increased risk of mortality (6-7). In children anemia leads to increased morbidity and mortality consequence of anemia, may lead to impaired cognitive function, growth and psychomotor development, especially in children (3-5). Infants, under 5-year-old children 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 (1). Anemia is associated with socioeconomic, biological, environmental and nutritional factors (3). According to the classification of anemia as a problem of public health significance Iraq

considered as complaining of sever public health problem table (2) (3).

Table 2. Classification of anemia as a problem of public health significance (3, 8)

Category of public health significance	Prevalence of anemia
No public health problem	0-4.9 (%)
Mild public health problem	5.0-19.9 (%)
Moderate public health problem	20.0-39.9 (%)
Sever public health problem	≥ 40.0 (%)

%=Percent

Knowledge of anemia incidence, identification of associated ages, under-standing of the associated physiologic condition, classification of anemia, and interpretation of pertinent laboratory values will assist the nurse in evaluating the child with anemia (9).

Methodology:

A descriptive cross sectional study was conducted at the primary health care centers in Al-Sadder city for the period of the 1st July 2011 to the 1st November 2011. Non probability (purposive) sample of (630) child were selected from primary health care centers of Alsadr city.

The reliability of the questionnaire was determined through a pilot study and the validity through a panel of experts. The data were analyzed through the application of descriptive statistic frequency, percentage, and the application of inferential statistical procedures, which include multiple logistic regressions. After extensive review of available literature and related studies a questionnaire format constructed. The questionnaire format consists of two parts, which include:

Part one: Demographic Characteristics

This part includes demographic characteristics related to the children and their family such as child's gender, parent's education level, parents' occupation, worms' infection, pica and family monthly income.

Part two: laboratory Test

This part includes hemoglobin concentration for diagnosis of anemia.

According of WHO cut-off point children age 6 months 5 years who has hemoglobin value less than 11 g/dl is considered a diagnostic anemia (3) (9).

Capillary blood was collected from the child's finger, blood samples were taken to determine hemoglobin concentrations, Hb estimation by using hemoglobin meter.

Hemoglobin measurement in the peripheral blood was obtained by finger prick and readings were made in a portable hemoglobin meter which was calibrated daily as per the manufacturer's specifications. Data

analyzed by descriptive statistics (frequency, percentage, and the application of inferential statistical procedures, which includes chi-square).

Results:

Table 3. Distribution of children and their families by demographic characteristics

	Variables	Frequency	Percent
Child's Gender	Male	322	51
	Female	308	49
	Total	630	100
Child's Age	Infant	249	39
	Toddler	243	38
	Preschool	138	23
	Total	630	100
Supplement diet	Supplement	357	57
	No supplement	273	43
	Total	630	100
History with Worms infection	Hookworm	440	70
	No hookworm	190	30
	Total	630	100
Children history with pica	Pica	165	26
	No pica	465	74
	Total	630	100
Family monthly income	Adequate	359	57
	Inadequate	271	43
	Total	630	100
Mothers' education	Below secondary level	158	25
	secondary level and up	472	75
	Total	630	100
Fathers' education	Below secondary level	403	64
	secondary level and up	227	36
	Total	630	100
Mothers' occupation	Unemployment	613	97
	Employment	17	3
	Total	630	100
Fathers' occupation	Unemployment	586	7
	Employment	44	93
	Total	140	100

This table indicates that more than half of the sample (51.0%) are boys, (39.0%) were infants, (43.0%) were without supplement diet after 6 months, (70.0%) had no history with hookworm, (74.0%) had no history with pica, (43.0%) of children live with inadequate monthly income, (75.0%) and (36.0%) of their mother and father respectively had below secondary school level, (97.0%) and (36.0%) of their mother and father respectively were unemployment.

Figure I. Distribution of anemia in children by hemoglobin level according to WHO classification. This figure indicated that 69% of children were anemic

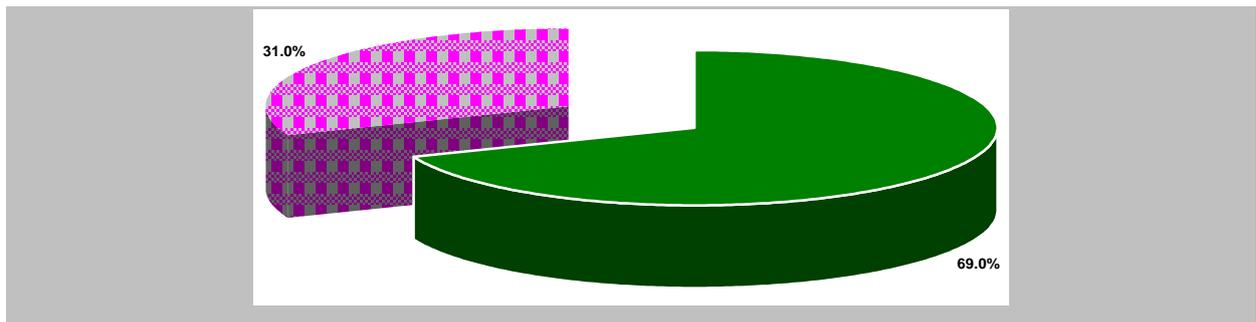


Figure II: Distribution of anemia in children according to the severity of anemia, this figure indicates that (64.0%) of children has mild to moderate anemia. According to this figure, Indicate that the infants have a higher percentage 37% of having moderate to severe anemia than the greater than toddler.

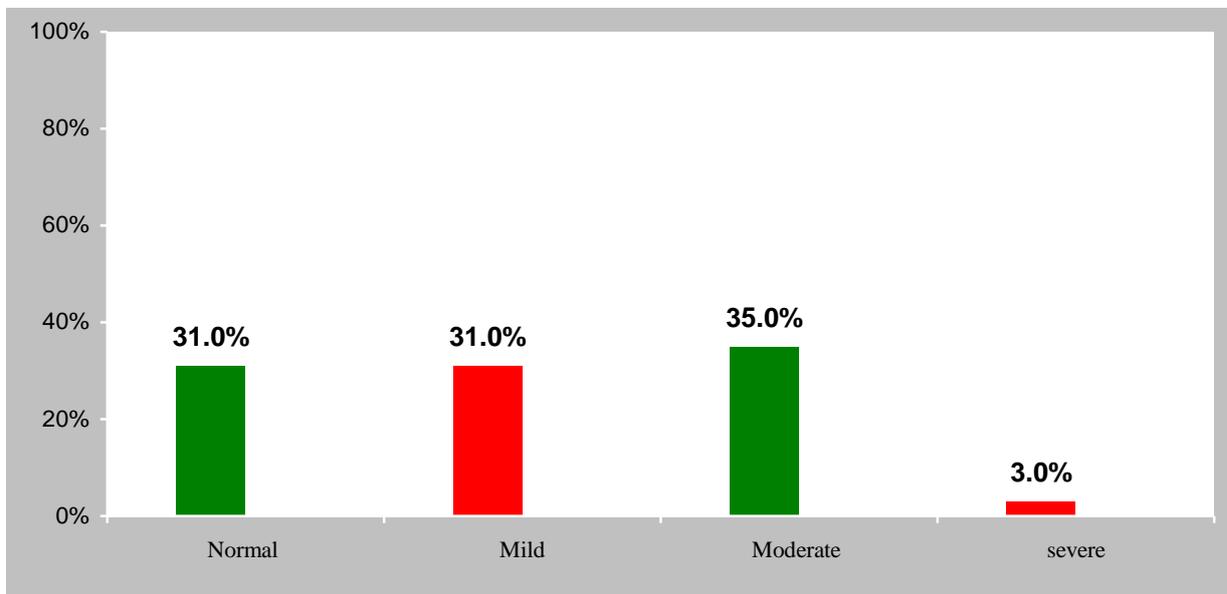


Table 4. Logistic Regression Using severity of Anemia with Socio-demographic Variables

Severity of Anemia	OR	95% CI	p
Age	1.0	0.6, 1.4	.858
Gender	0.8	0.6, 1.2	.325
Supplement diet	2.6	1.8, 3.8	.000
worms infection	1.0	0.7, 1.6	.951
Eating clay (pica)	0.6	0.4, 1.0	.045
Family monthly income	1.1	0.7, 1.4	.026
Mother history with anemia	1.2	0.8, 1.8	.280
Fathers' education	1.3	0.8, 2.0	.231
Mothers' education	1.7	1.1, 2.7	.025
Fathers' employment	0.8	0.4, 1.7	.645
Mothers' employment	1.2	0.4, 3.4	.767
Constant	.181		.343

CI: Confidence Interval; OR: Odd Ratio; P: Probability level

Supplement diet [OR =2.6 (95% CI: 1.8, 3.8)], eating clay (pica) [OR =1.1 (95% CI: 0.7, 1.4)], mother's education [OR =1.7 (95% CI: 1.1, 2.7)] and family monthly income [OR =0.6 (95% CI: 0.4, 1.0)]. This table indicated multivariate logistic regression that includes children demographic variable, children clinical variable and family demographic variables .Four variable were statistically significant independent determined of anemia these were supplement diet, eating clay (pica), mother's education and family monthly income.

Children they don't received supplement diet are 2.6 time more likely to be anemic than children with supplement diet. Children with history with pica are 0.6 time more likely to be anemic than children without history with pica. Children with inadequate family monthly income are 1.1 time more likely to be anemic than children with adequate monthly family. The children who have mother's education below secondary graduated level are 1.2 times more likely to be anemic than children who have mother's education secondary graduated level and up.

Discussion:

There is a dearth of information on the epidemiology of anemia in the Iraq. This study attempt to provide new information about anemia and severity of anemia in al-sadder city in children less than five years, and link between severities of anemia with socio-demographic factors that may confound or modify this association.

This study screened 630 child aged from 6 months to 5 years in Alsadr city Anemia was defined as Hb<11.0 g/ dl⁽⁵⁾. In total about (69%) of children were found to be anemic. according to WHO classification this study indicated that anaemia should be considered as a major or sever health .problem in Iraq this result was contrast with classification of WHO, (2005) for anemia by countries that consider Iraq as severe anemia⁽⁷⁾.

According to the present study, the severity of anemia was moderate to severe anemia seen in 35 % of children of children figure (II). This results are similar to the study done In India they screened 599 children in the age group between 6 month - 14 years , about 93.8% of samples were found to be anemic; 42.1% had mild anemia, 49.1% had moderate anemia and 8.8% had severe anemia. Another study carried out in Tanzanian children which found that prevalence of anemia about (87%), also in this study 37% of them had moderate and 3% had severe anemia⁽¹⁰⁾. While study in Islamic republic of Iranian found that severity of anemia in children aged between 2–6 years, 7.3% were diagnosed with mild anaemia, 2.5% moderate anaemia and 1.0% severe anaemia⁽¹¹⁾.

The results of the study indicated that there was a significant relationship between supplement diet, eating clay (pica), Family monthly income and mother's education these result supported and agree with studies carried

out in the Morocco⁽¹²⁾, Palestinian⁽¹³⁾, Iraq⁽¹⁴⁾ and Pakistan⁽¹⁵⁾.

Recommendations:

This study present anemia as severe public health problem and more than third of sample had moderate-severe anemia. Finally, the researchers recommended application of screening program for anemia to determine the severity of anemia, and increase community awareness about the dangers of anemia, especially severe anemia in children.

References:

- Jennifer, L. and Simon, B.: **Impact of Hookworm Infection and Deworming on Anemia in Non-pregnant Populations: A systematic Review**, *Trop Med Int Health*. 2010; 15(7): 776–795.
- Kyle T. **Essential of Pediatric Nursing**, Lippincott, Williams and Wilkins, 2008; pp 612-617
Joseph, J. and Jeffrey T.: **Anemia in Children**, *Am Fam Physician*, 2001; 64:1379-86.
- Amal, A., Manal, M., Manal, A., Amal, A. and Raya A.: **Relationship between Anemia and Blood Levels of Lead, Copper, Zinc and Iron among Children**, *BMC Research Notes*, 2010; 3:133.
- Datta, P.: **Pediatric Nursing**, Second Edition, Replica Press, 2009; P.P. 337-345.
- Bernard, J., Zulfiqarali, P. and Francine, V.: **An analysis of Anemia and Child Mortality**, *Journal of Nutrition*, 2001; 131 (25): 636-648.
- Karimi, M., Mirzaei , M. and Dehghani, A.: **Prevalence of Anemia, Iron Deficiency and Iron Deficiency Anemia in 6-60 Month Old Children in Yazd's Rural Area**, *International Pediatrics*, 2004; 19(3): 180-184.
- World Health Organization (WHO): **Worldwide Prevalence of Anemia 1993-2005**, Global Database on Anemia, 2005.

8. Karine, T. and Jennifer F.: **An update on Anemia in Less Developed Countries**, *Am J Trop Med Hyg*, 2007; 77, (1): 44-51.
9. Schellenberg, D., Armstrong, J., Mushi, A., De Savigny, D., Mgalula, L. and Mbuya, C.: **The Silent Burden of Anemia in Tanzanian Children: A community-based Study**. *Bulletin of the World Health Organization*. 2003; 81 (8):PP. 581-590.
- 11- Sayyari, A., Sheikhol-Eslam, R. and Abdollahi, Z.: **Prevalence of Anaemia in 2–12-year-old Iranian Children**, *Eastern Mediterranean Health Journal*, 2006; 12(6): 804-808.
12. Hioui, M., Ahami, A., Aboussaleh, Y., Rusinek, S., Dik, K., Soualem, A., et al.: **Risk Factors of Anaemia among Rural School Children in Kenitra, Morocco**, *East African Journal of Public Health*, 2008; 5(2): 62-66.
13. Mikki, N., Stigum, H. and Holmboe-Ottesen, G.: **Anemia Prevalence and Associated Sociodemographic and Dietary Factors among Palestinian Adolescents in the West Bank**. *Eastern Mediterranean Health Journal* , 2011; 17(3).
14. Alanee, H. Ahmed: **Prevalence of Anemia among Children with Persistent Diarrhea with A trial of Zinc Therapy**. *Tikrit Medical Journal*. 2008; 14(1): 172-179
15. Zahira, B., Muhammad, Z., Ashfaq, M. and Tanvir, A.: **Socio-cultural Factors Affecting Anemia and Their Effects on Mother and Child Health in Rural Areas of District Faisalabad, Punjab, Pakistan**. *Pak. J. Agri. Sci.* 2010; 47(1): 59-65.