Volume : 2 | Issue : 11 | November 2013 • ISSN No 2277 - 8179

Research Paper

Comparison of Clinical Evaluation of Anemia by Health Care Worker with Actual Laboratory Hemoglobin Estimation: A Cross Sectional Study

Medical Science

KEYWORDS :

Dr. Praful Bambhroliya	MD Peadiatrics, Government medical college, Surat
Dr. Dipal K Jethwa	MD MIcrobiology, Government medical college,Surat
Dr Darshan chauhan	MD Peadiatrics, Government medical college Surat
Dr. Shah Vijay	

ABSTRACT

Background & Objective: Anemia is a major health problem in young children in our country. Early detection and treatment of mild to moderate anemia is lacking at grass root level by health care worker mainly due to poor laboratory facilities and they finally progress to recurrent illness, physical and mental growth restrictions. So good clinical evaluation is necessary which is easy and feasible by health care worker to detect anemia may prevent its complications. This study is done to determine best clinical parameter for diagnosis of anemia.

Subjects and methods: total 1500 children between age group of 6 months to 5 years were evaluated by health care workers after proper training and under supervision of medical teachers in OPD of department of pediatrics of government medical college, Surat. Simultaneously Hemoglobin estimation of all enrolled children was done in laboratory and values were compared with clinical evaluation done by health care worker. Statistical analysis was done by standard specificity and sensitivity calculations in SPSS and EpiInfo software.

Results: Sensitivity to detect no, some and severe anemia were found 100%, 71.2% and 52.3% respectively by palmer pallor examination, 85.7%, 74% and 33.3% respectively by conjunctiva pallor examination, 100%, 53.7% and 33.3% respectively by tongue pallor examination and 100%, 49% and 38% respectively by nail pallor examination while specificity to detect no, some and severe anemia were found 82.9%, 76.1% and 93% respectively by palmer pallor examination, 82.1%, 59.5% and 96.1% respectively by conjunctiva pallor examination, 61.2%, 69% and 99.2% respectively by tongue pallor examination and 58.1%, 69% and 99.2% respectively by nail pallor examination when done by health care worker in comparison to actual hemoglobin estimation.

Conclusion: Most preferable site is palmAr pallor followed by conjunctiva pallor, as a screening tool for evaluation of degree of anemia and they are better than that of tongue pallor and nail bed pallor.

INTRODUCTION

Anemia is a major health problem among young children in India as well as other developing and even developed country. Among all causes of anemia, iron deficiency anemia is the major burden[(1)]. Iron deficiency anemia is associated with higher infant and under five mortality rates [(3,4,5)]. Not only physical but also cognitive and mental growth of children is hampered due to anemia.

Table – 1: Classification of anemia as a problem of public health significance [(2)].

% of prevalence of anemia in population	Category of public health significance
≤4.9	No public health problem
5.0–19.9	Mild public health problem
20.0–39	Moderate public health problem
≥40.0	Severe public health problem

Anemia is severe public health problem in our country mainly due to lack of prevention and early detection of anemia with delay in introduction of treatment, particularly at primary health care level. Many times even estimation of hemoglobin for diagnosis of anemia is not available, at this situation clinical evaluation of anemia by health care worker or paramedical staff will provide great help in early introduction of treatment and reduction in overall prevalence of anemia.

SUBJECTS AND METHODS

Study was performed at the outpatient department between February 2013 and September 13. This is the cross sectional study by comparing degree of anemia by clinical parameter with actual hemoglobin estimation. In clinical parameter, palmar pallor, conjunctiva pallor, nail bed pallor and tongue pallor were taken for evaluation of anemia.

Inclusion criteria:

- Age of child between 6 months and 5 years
- Patient visited outpatient department

Exclusion criteria:

- Seriously ill patient required emergency hospitalization
- Children having shock, poor perfusion, visible jaundice, conjunctivitis, other ophthalmic infection, disorders involving nail bed and oral mucosal ulcerations.

Written consent taken from parents or guardian of all subjects. Such 1500 children were evaluated by IMNCI trained nursing staff, anganwadi workers or GNM nursing students. Examination of clinical parameters were taught by professors from department of pediatrics, government medical college Surat, before starting the study. And all evaluations of subjects were done by them under observation of either teaching staff or resident doctor of pediatrics department.

In all clinical parameters, anemia was classified in no anemia, some anemia and severe anemia. Conjunctiva pallor was evaluated by everting the lower eyelid and examining the palpebral conjunctiva. Normal conjunctiva has full or nearly full redness of the anterior rim. Some conjunctiva pallor is those with neither clearly red nor clearly pale anterior rims or those in which one conjunctiva is severe pale and the other is normal.Severe Pale conjunctiva is those with very little or no evidence of red color on the anterior rim, which matched the fleshy colour of the posterior aspect of the palpebral conjunctiva[(42)]

The nail beds were examined for pallor without compressing the nail. No pallor has a pink colour while severe pallor has a white colour and some pallor is in between severe and some pallor.

Superior surface of tongue was examined for pallor under natural light. No pallor has a pink colour while severe pallor has a white colour and some pallor is in between severe and some pallor.

2 ml of blood was withdrawn by venipuncture and collected in EDTA vacutainer and hemoglobin estimation was done by automated hematology analyzer (HORIBA ABX Micros 60).

All laboratory values of estimated hemoglobin were classified in no, mild, moderate and severe anemia according to WHO slan-

Volume : 2 | Issue : 11 | November 2013 • ISSN No 2277 - 8179

dered definition for anemia in children.

Statistical analysis of data was carried out using SPSS and EpiInfo software. Various test like One-way analysis of variance (post Hoc tukey method), Sensitivity and Specificity were calculated. For children anemia was defined according to WHO definition.

The Study protocol was approved by ethical committee of Government medical college, Surat.

Results:
In this study total 1500 Children were evaluated with age group from 6 months to 59 months. Mean age in this study was 32.8 months with male:female ratio is 55:45.

Table – 2: Mean hemoglobin level were calculated in each group with subgroup of no, some and severe anemia

	Mean hemoglobin level		
pallor	no	some	Severe
Palmar	10.9 +/-1.15	9.6 +/- 1.51	6.2 +/- 0.93
Conjunctiva	10.2 +/-1.31	9.1 +/- 1.45	5.96 +/- 1.01
Tongue	10.09 +/- 1.25	8.6 +/-1.4	5.45 +/- 0.84
Nail	10.08 +/- 1.16	7.6 +/- 1.5	5.58+/- 0.89

Table – 3: Comparison between no, some and severe palmer pallor with WHO Classification of anemia

Hb level	palmar pallor n (%)			
WHO classification	No	some	severe	total
more then 10.9	210(14)	0	0	210
9 to 10.9	160(10.66)	490(32.66)	0	650
7 to 8.9	60(4)	280(18.66)	90(6)	430
less than 7	0	100(6.66)	110(7.33)	210

on palmer examination all children having no anemia as the hemoglobin level was more then 10.9, 71.2% patients of mild to moderate anemia and 52.3% patients of severe anemia were correctly identified by health worker

Table – 4: Comparison between no, some and severe conjunctival pallor with WHO Classification

Hb level	Conjunctiva pallor n(%)			
WHO classification	no	some	severe	
more then 10.9	180(12)	30(2)	0	210
9 to 10.9	120(8)	530(35.33)	0	650
7 to 8.9	110(7.33)	270(18)	50(3.33)	430
less then 7	0	140(9.33)	70(4.66)	210

On conjunctiva examination 85.7% children having no anemia, 74% patients of mild to moderate anemia and only 33.3% patients of severe anemia were correctly identified by health worker

Table – 5: Comparison between no, some and severe tongue pallor with WHO Classification

Hb level	Tongue pallor n(%)			
WHO classification	no	some	severe	
more then 10.9	210(14)	0	0	210
9 to 10.9	310(20.66)	340(22.66)	0	650
7 to 8.9	180(12)	240(16)	10(0.66)	430
less then 7	10(0.66)	130(8.66)	70(4.66)	210

On tongue examination all children having no anemia, 53.7% patients of mild to moderate anemia and only 33.3% patients of severe anemia were correctly identified by health worker

Table – 6: Comparison between no, some and severe nail bed pallor with WHO Classification

Hb level	Nail bed pallor			
WHO classification	no	some	severe	
more then 10.9	210(14)	0	0	210
9 to 10.9	360(24)	290(19.33)	0	650
7 to 8.9	180(12)	240(16)	10(0.66)	430
less than 7	0	130(8.66)	80(5.33)	210

On nail bed examination all children having no anemia, 49% patients of mild to moderate anemia and only 38% patients of severe anemia were correctly identified by health worker

Table - 7: Result of sensitivity and specificity of clinical evaluation of anemia

Sensitivity (%)			
	No	some	Severe
palmar pallor	100	71.2	52.3
conjunctiva pallor	85.7	74	33.3
tongue pallor	100	53.7	33.3
nail pallor	100	49	38

Specificity (%)			
	no	some	Severe
palmar pallor	82.9	76.1	93
conjunctiva pallor	82.1	59.5	96.1
tounue pallor	61.2	69	99.2
nail pallor	58.1	69	99.2

DISCUSSION
Present study shows that clinical criteria can be used to identify children with mild to moderate or severe anemia by health care workers or paramedical staff, thus enabling implementation of treatment algorithm for anemia even when hemoglobin estimation is not available. Prevalence of anemia (Hb <11) is 86% in this study which shows burden of anemia in pediatric population.

Mean hemoglobin levels in no anemia group is significantly lower when compared with WHO classification and particularly in conjunctiva site while they were well correlated in some and severe anemia group for all four clinical site.

In palmar site for evaluation of anemia, there was a 100 % sensitivity to diagnose no anemia by examination of palmar pallor while severe palmar pallor had 52.3 % sensitivity to diagnose severe anemia, and some palmar had a 71.2 % sensitivity to diagnose mild to moderate anemia.

In conjunctiva site ,there was 85.7 % sensitivity to diagnose no anemia by examination of conjunctiva pallor, while severe conjunctiva pallor had only 33.3 % sensitivity to diagnose severe anemia while some conjunctiva pallor had highest 74 % sensitivity to diagnose mild to moderate anemia.

In tongue site, No pallor at tongue had 100% sensitivity for diagnosis no anemia, while some pallor at tongue had 53.7 % sensitivity for diagnosis of mild to moderate anemia and severe pallor at tongue had 33.3 % sensitivity for diagnosis of severe anemia.

In nail bed site, No pallor at nail bed had 100% sensitivity for diagnosis No anemia, while some pallor at nail bed had 49 % sensitivity for diagnosis of mild to moderate anemia and severe pallor at nail bed had 38 % sensitivity for diagnosis of severe

anemia.

Palmar pallor, conjunctiva pallor and nail bed pallor all three are good tool for detection of presence or absence of anemia as all three having high sensitivity.

Most preferable site is palmar pallor followed by conjunctiva pallor, as a screening tool for evaluation of degree of anemia and they are better than that of tongue pallor and nail bed pallor.

CONCLUSION

Severe conjunctiva, tongue and nail pallor have high specificity for diagnosis of severe anemia. So if severe anemia is classified at these sites, chances of hemoglobin < 7gm/dl is very likely.

More suitable site for evaluation to rule out anemia is palm and conjunctiva.

More suitable site for keeping high suspicion of index of severe anemia is also palmar pallor.

Clinical evaluation of anemia is useful to peripheral health worker for early detection and treatment of mild to moderate anemia,severe anemia that helps in overall reduction of prevalence of anemia.

REFERENCE

1. World Health Organization. The World Health Report 2002: Reducing risks, promoting healthy life. Geneva: World Health Organization; 2002. | 2. Iron deficiency anaemia: assessment, prevention, and control. A guide for programme managers. Geneva: World Health Organization; 2001 (WHO/NHD/01.3). | 3. Macgregor M. Maternal anaemia as a factor in prematurity and perinatal mortality. Scottish Medical Journal 1963; 8:134. | 4. Scholl TO, Hediger ML. Anemia and iron-deficiency anemia: compilation of data on pregnancy outcome. American Journal of Clinical Nutrition, 1994, 59:492S–500S. | 5. Bothwell T, Charlton R, eds. Iron deficiency in women. Washington DC, Nutrition Foundation, 1981. | 6. Bruno de Benoist, Erin McLean, Ines Egli, Mary Cogswell. Worldwide prevalence of anaemia 1993-2005 WHO Global Database on Anaemia. Geneva: World Health Organization; 2008. | 7. INTIGRATED MANAGEMENT OF NEONATAL AND CHILDHOOD ILLNESS. New Delhi: Ministry of Health & Family Welfare Government of India 2009. | 8. WHO. Haemoglobin concentrations for the diagnosis of anaemia and assessment of severity. Vitamin and Mineral Nutrition Information System. Geneva: World Health Organization; 2011 (WHO/NMH/NHD/MNM/11.1). | 9. Nutritional anaemias. Report of a WHO scientific group. Geneva: World Health Organization; 1968. (WHO Technical Report Series, No.405). | Available at: http://whqlibdoc.who.int/trs/WHO_TRS_405.pdf | | 10. Clark J, Nelson W, Lyons C, et al. Chronic shock: the problem of reduced blood volume in the chronically ill patient. Part III. Quantitative aspects of the anemia associated with malignant tumors. Ann Surg 1947; 125: 638–646. | 11. Ellison E, Zollinger RM, Cedars N, et al. Value of blood volume determinations in gastrointestinal disease. Arch Surg 1953; 66: 869–877. | 12. Peden J, Maxwell M, Ohin A, et al. A consideration of indications for preoperative transfusions based on analysis of blood volumes and circulating proteins in normal and malnourished patients with and without cancer. Ann Surg 1960; 151: 303–318. | 13. Fawcett J, Wynn V. Effects of posture on plasma volume and some blood constituents. J Clin Pathol 1960; 13: 304–310. |