

Anaemia in Children: Part I. Can Simple Observations by Primary Care Provider Help in Diagnosis?

Pages with reference to book, From 282 To 284

Inayat H. Thaver, Lubna Baig (Baqai Institute of Health Sciences, Baqai University, Karachi.)

Abstract

The commonest and reliable method of diagnosing anaemia is by determining haemoglobin levels, which is an invasive technique. This cross-sectional study aims to detect the validity of diagnosing anaemia by simple non-invasive clinical techniques. This study screened 951 children (6-60 months) residing in a squatter settlement of Karachi. Every child was first labelled anaemic or normal by a clinical scoring system and then his/her haemoglobin was tested by finger prick method on a Hemocue. Mean age was 31.1 ± 15.3 months ($n=945$) and median was 32 months. The prevalence of anaemia by Hemocue was 78% (Anaemia= $Hb < 11$ gms%) and by clinical examinations 68%. Conjunctivae alone had the highest sensitivity (74%) and nails alone highest specificity (96%). Nails alone had the highest positive predictive value and conjunctivae alone highest negative predictive value (43.2%). Combinations of conjunctivae with either nails, palm or tongue yielded the highest validity. The results indicate that in PHC settings with no laboratory facilities, anaemia can be detected by pallor of conjunctivae associated with pallor of either nails, palm or tongue (JPMA 44:282, 1994).

Introduction

Total prevalence of anaemia in the world is about 30% of estimated world population of 5000 million people¹. Young children and pregnant women are mostly affected, globally. Regions with highest prevalence of anaemia are South Asia and Africa. Estimated global prevalence of anaemia in young and school age children is 43% and 37% respectively². According to National Nutritional Survey 1988³, the prevalence of anemia in children of 7-60 months is sixty-five percent. Although many sophisticated tests have been devised for the diagnosis of iron deficiency, the most reliable criterion of iron deficiency anaemia is the haemoglobin response to an adequate therapeutic trial of iron⁴. If the response to iron falls short of peak, i.e., haemoglobin rise at an average of 0.25-0.4 / g/dl/day, then other causes of anaemia should be sought⁵. The most common way to diagnose anaemia is by haemoglobin estimation which is controlled by a homeostatic mechanism'. Haematocrit values⁶, serum Iron and transferrin saturation⁷ have also been used in assessing the iron stores of the body. All these methods require an invasive technique which may not be acceptable, specially to children. Simple finger-prick method (with minimum invasive technique) for mass screening for anaemia described by Shah et al.⁸ was satisfactory and cost effective. This study aims at finding out the validity (sensitivity and specificity⁹) of detecting anaemia by simple clinical methods without any invasive procedures (even the finger prick, in case of a child).

Subjects and Methods

All the children from 6 to 60 months residing in a squatter settlement were included in this screening project. These children belonged to the registered families of the Aga Khan Primary Health Care Project. After a thorough training of 2 medical officers, each child was first examined clinically according to a screening system (Table I and labelled as "anaemic" or "normal" (case definition).

Table I. Guidelines for clinical detection of anaemia by physician.

Site	Normal	Anaemia		
		Mild	Moderate	Severe
Conjunctivae	Red/Normal	Mid pallor	Moderate pallor	Severe pallor
Tongue	Normal red with papillae	Some pallor	Mild pallor	Plain, smooth pale tongue
Nails	Normal/red	Mild to moderate pallor	Flattening of nails	Koilonychia (spooning)
Palms	Normal/red	Some pallor	Mild pallor	Severe pallor

Later, haemoglobin level was estimated by finger-prick, using a Hemocue. Children having a haemoglobin of less than 11 Gm% were labelled as "anaemic". The results were given to the mother immediately and informed about treatment if required. Hemocue, used, was calibrated at the Pathology Laboratory of the Aga Khan University Medical Centre, before mass screening was started. The machine was checked daily, with a standard sample and calibrated every third day at the laboratory for accuracy. The readings of the machine were found within range on each occasion indicating the reliability of the instrument.

Results

Nine hundred and fifty one children (6-60 months) were screened. Some information on 4 children was either missing or not valid, they were thus not included in the analysis. Mean age was 31.1 ± 15.3 months, median being 32.0 months. Male and female children were equally represented; 48% and 52% respectively. Mean haemoglobin was 9 ± 1.8 , and the range was 3.9 to 16.2 gm/dl. Eighty percent of children ($n=947$) were anaemic. No significant difference in anaemia was observed in either sex. Peak prevalence of anaemia was observed in 6-12 months and 31-36 months age groups. A steady decline in anaemia was observed after 36 months. ($P < .000$). Overall, 68% of all children were anaemic. Taking 'conjunctivae' only, as a screening tool, 88% of children were anaemic (sensitivity=74.1%). In contrast the sensitivity of detecting anaemia by examining tongue was 20%, nails 15% and for palms it was 33%. This indicates that for screening purposes, conjunctivae is the best site as it has relatively higher sensitivity and specificity (64%) (Table II).

Table II. Sensitivity, specificity and predictive values of detecting anaemia by observation of different parts of body.

Variables	Sensitivity	Specificity	+ve predictive value	-ve predictive value
Conjunctivae	74.1	64.5	87.9	43.2
Tongue	20.2	94.1	92.5	24.8
Nails	14.9	96.1	93.1	20.2
Palms	32.0	89.7	91.7	27.0

To increase both positive and negative predictive value along with high sensitivity and specificity, a combination of sites for observations were analyzed (Table III).

Table III. Validity of detecting anaemia by observation of conjunctivae and any of the other sites.

Variables	Sensitivity	Specificity	+ve predictive value	-ve predictive value
Conjunctivae +Palms	78.6	62.1	88.1	44.8
Conjunctivae +Nails	75.6	63.5	88.1	42.2
Conjunctivae +Tongue	75.2	63.1	87.9	41.6

Cut-point were taken when both conjunctivae and either of the sites were pale (mild/moderate/severe).

Examination of conjunctivae alongwith either of palms, nails or tongue would result in higher validity of this method of detection of anaemia.

Discussion

A high sensitivity of detecting anaemia by the examination of conjunctivae indicates that, in primary health care setting, this method will be most cost-effective in an area where sophisticated instruments are not available or people cannot afford to get these tests done. Thus, in our situation even if deficiency tests are not done, the most reliable criterion may be the simple observations only. A primary care physician, if vigilant and good observant, can easily pick up the anaemic children without any invasive techniques.

References

1. DeMaeyer, E. and Adiels-tegman, M. The prevalence of anaemia in the world. *World Health Stat.Q.*, 1985;38:302-16.
2. World Health Organization, Preventing and controlling iron deficiency anaemia through primary health care: a guide for health administrators and programme managers. Geneva, DeMayer, E.M., WHO., 1989, p.8.
3. National Nutritional Survey 1985-87. Nutrition Division, National Institute of Health, Islamabad, Government of Pakistan, 1988, p. 35.
4. Lankowsky, P. Problems in diagnosis of iron deficiency anaemia. *Pediatr. Ann.*, 1985;14:618:622-27.
5. Cook, J.D. Nutritional anaemia. *ASDC.J.Dent.Child.*, 1983;50:305-8.
6. Yip, R., Schwartz, S. and Deinard, A.S. Hematocrit values in white, black and American Indian children with comparable iron status. Evidence to support uniform diagnostic criteria for anaemia among all races. *Am.J.Dis.Child.*, 1984;138:824-27.
7. Leyland, M.J., Baksi, A.K., Brown, P.J. et al. Assessment of nutritional anaemia in Northern Nigeria. *Ann.Trop.Med.Parasitol.*, 1979,73:63-71.
8. Shah, U., Pratinidhi, A.K., Bhatlawande, P.V. et al. Using community health workers to screen for anaemia. *World Health Forum*, 1984;5:35-36.
9. Gillings, B.D. and Douglass, C.W. *Biostats. A primer for health care professionals.* Massachusetts, Cavco Publication, 1982, pp. 11-14.