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TO ASSESS THE ACCURACY OF CLINICAL PALLOR IN PEDIATRIC PATIENTS DIAGNOSED OF ANEMIA IN NORTH BIHAR REGION: AN OBSERVATIONAL STUDY.

Dr. Satyendra Paswan[1], Dr. Nagendra Prasad Gupta[2], Dr. Shaantanu Kumar[3]
[1]Post Graduate Student, Department of Pediatrics, Darbhanga Medical College and Hospital, Darbhanga, Bihar, India
[2]Associate Professor, Department of Pediatrics, Darbhanga Medical College and Hospital, Darbhanga, Bihar, India
[3]Post Graduate Student, Department of Pediatrics Darbhanga Medical College and Hospital, Darbhanga, Bihar, India

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Corresponding author: Dr. Nagendra Prasad Gupta
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Abstract

Aim: to assess the accuracy of clinical pallor in pediatric patients diagnosed of anemia.

Material and Methods: The present prospective observational study was conducted in the Department of Pediatrics Darbhanga Medical College and Hospital, Darbhanga, Bihar, India from August 2019 to March 2020 among 200 anemic children attained the age between 6 months to 5 years. Blood was drawn by venepuncture and hemoglobin estimation was done by cyanmethemoglobin method. Anemia was diagnosed when hemoglobin was less than 11g/dl.

Results: anemia is less common among infants aged below 12 months. The moderate anemia was best detected by using palm pallor or pallor of the nail beds (sensitivity 92-95%), while conjunctival pallor was least useful (sensitivity 82%).

Conclusion: This study demonstrates that clinical criteria can be used to identify children with anemia of moderate degree who need treatment with iron. Moderate anemia is associated with morbidity that may progress to severe anemia and death unless prevented by treatment with iron.

Keywords: Anemia, Accuracy, Pallor, Infants

Introduction

Anemia is pathophysiologically diverse and often multifactorial.[1] Anemia is one of the most commonly encountered hematologic disease of infancy and childhood.[2] More than 75% of Indian children under 36 months of age are found to be anemic.[3]

Iron-deficiency anemia is a global health problems and a common medical condition seen in everyday clinical practice. Although the prevalence of iron-deficiency anemia has recently declined, iron deficiency continues to be the top-ranking cause of anemia worldwide, and iron-deficiency anemia has a substantial effect on the lives of young children in both low-income and developed countries.[4] Most of the cases are of the iron deficiency type and many factors are responsible for this.[5]

Anaemia is related to impaired physical growth and mental development.[6] It is also associated to a higher risk of infant and child mortality, particularly when it co-exists with malnutrition and other risk factors.[7]

It is therefore important to make a timely and accurate diagnosis and initiate an early intervention to reduce the negative impact of anaemia. The laboratory diagnosis of anaemia through any of several techniques is not widely available and its cost is often unaffordable in poor areas of the world.

This stimulated several studies to assess the accuracy of clinical signs for screening of anaemia. Thus we were prompted to perform the present study to assess the accuracy of clinical pallor in pediatric patients diagnosed of anaemia.

Materials and Methods

The present prospective observational study was conducted in the Department of Pediatrics Darbhanga Medical College and Hospital, Darbhanga, Bihar, India from August 2019 to March 2020 among 200 anemic children attained the age between 6 months to 5 years.

Inclusion Criteria

1. Parents/guardian who have provided the informed consent
2. Between 6 months to 5 years of age

Exclusion Criteria

1. Parents/guardian who have not signed the informed consent

Ethical approval and Informed consent

The study protocol was reviewed by the Ethical Committee of the Hospital and granted ethical clearance. After explaining the purpose and details of the study, a written informed consent was obtained.

Sample selection

The sample size was calculated using a prior type of power analysis by G* Power Software Version 3.0.1.0 (Franz Faul, Universitat Kiel, Germany). The minimum sample size was calculated, following these input conditions: power of 0.80 and $P \leq 0.05$ and sample size arrived were 195 participants.

Methodology

Enrolled children had a detailed history and clinical examination by a study physician (first physician). The first physician documented the child's age in months, sex, difficulty in breathing respiratory rate, pulse rate, pallor (whether severe or moderate, and if the conjunctiva, palm, nailbed or tongue were involved). After clinical examinations were completed by the first physician, a second physician re-examined the children who had been enrolled and documented his decisions on pallor, whether severe or moderate and whether the conjunctiva, palm, nailbed or tongue were involved, without any information from the first examination. After the second examination, the child underwent a blood examination for haemoglobin.

Blood was drawn by venepuncture and hemoglobin estimation was done by cyanmethemoglobin method. Anemia was diagnosed when hemoglobin was less than 11g/dl (WHO standard).[8]

Children were classified as anaemic if their haemoglobin was 11 g/dl, moderately anaemic if the haemoglobin was 8 g/dl and severely anaemic if the haemoglobin level was 5 g/dl. For the analysis of sensitivity and specificity, the cut-off points of 8 and 5 were used, as they are clinically meaningful for the initiation of iron supplementation and referral for transfusion, respectively

Statistical analysis

The recorded data was compiled and entered in a spreadsheet computer program (Microsoft Excel 2010) and then exported to data editor page of SPSS version 19 (SPSS Inc., Chicago, Illinois, USA). Descriptive statistics included computation of percentages and means. Pearson correlation coefficient was applied to analyze the quantitative data.

Results

Table 1: demographic profile of the study population

Variables	N (%)
Age (Months)	
<12 months	28 (14.0%)
12-24 months	39 (19.5%)
25-36 months	67 (33.5%)
>36 months	66 (33.0%)
Mean ± SD	34.89±6.21
Gender	
Male	118 (59.0%)
Female	82 (41.0%)

Table 2: distribution of study population according to severity of anemia and pallor site

Variable	N (%)
Severity	
Mild	54 (27.0%)
Moderate	102 (51.0%)
Severe	44 (22.0%)
Pallor Site	
Conjunctival	52 (26.0%)
Palm	71 (35.5%)
Nail Bed	77 (38.5%)

Table 3: Sensitivity and specificity of moderate and severe pallor at different sites as detected by the physician against haemoglobin values of less than 8 g/dl and 5 g/dl

Anemia Severity		Pallor site		
		Conjunctival	Palm	Nail Bed
Moderate	Sensitivity (%)	82	92	94
	Specificity (%)	80	62	69
Severe	Sensitivity (%)	52	56	54
	Specificity (%)	93	95	96

Discussion

Our data revealed a high prevalence of both severe and mild anemia, demonstrating the importance of identifying and appropriately managing children with anemia. We were able to show that anemia is less common among infants aged below 12 months, but then reach a persistent level over all age groups, and that males are affected more often than females.

Our study suggests that moderate anemia is best detected by using palm pallor or pallor of the nail beds (sensitivity 92-95%), while conjunctival pallor was least useful (sensitivity 82%).

A similar trend is also shown for severe pallor, even though the sensitivity values are low in this case. In Bangladesh, palm pallor had a lower sensitivity than conjunctival pallor for both severe and moderate anemia probably because of the increased palm pigment.[9]

Similarly, in a study from Pakistan it was found that conjunctival pallor had the highest sensitivity of all sites for detecting anemia with haemoglobin 11 g/dl in young children.[10] Other studies in Africa and of whites in the USA have shown that the nailbeds and palm are the best sites for assessing pallor in these settings.[11-13]

The analysis of the sensitivity of clinically severe pallor does not give as high a sensitivity but can still pick up as many as 50–56% of the children with haemoglobin levels 5 g/dl, similar to findings in Uganda and Bangladesh.[9] Identification of clinically severe pallor, thus, can detect more than half the children that require urgent transfusion and therefore need to be referred to a first-level referral hospital.

Conclusion

Our data indicate that a significant proportion of children with mild anemia can be missed if clinical pallor alone is used. However, compared to mild anemia, the sensitivity of clinical pallor improves when moderate anemia with a haemoglobin level 8 g/dl is used as the outcome. This study demonstrates that clinical criteria can be used to identify children with anemia of moderate degree who need treatment with iron. Moderate anemia is associated with morbidity that may progress to severe anemia and death unless prevented by treatment with iron.

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