

Diagnostic Accuracy of Clinical Pallor to Detect Anemia among Pregnant Females Seeking Antenatal Care in a Tertiary Care Hospital

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ABSTRACT

Background: One-third of the world's population is affected by anemia, and the vast majority of those who suffer from it live in developing countries. Eye, nail bed, facial, and palmer wrinkle coloration are some of the most classic indicators used to diagnose anemia in patients. This study is design to determine diagnostic accuracy of clinical pallor to detect anemia among female. If results of this study show high accuracy for clinical pallor to detect anemia, with different ethnic background and color complexion, testing for pallor can be used as an effective alternative method.

Objective: The goal of this study is to investigate the usefulness of clinical pallor in identifying anemia in pregnant women who attend the outpatient department of a tertiary care hospital, with the level of blood hemoglobin serving as the gold standard.

Methodology:

Settings: Department of Gynecology and Obstetrics Ward 8, Jinnah Postgraduate and Medical Centre, Karachi.

Duration: 06 Months from 29-03-2017 to 29-09-2017

Design: Cross sectional Validation Study

Subject and Methods: There were 393 pregnant women that participated in this study. They all sought prenatal care at the Emergency Clinic or the Outpatient Department. Hemoglobin concentrations in the patient's blood were recorded in the investigation's chart as the reference variable. On the same day five milliliters of blood was drawn for assessment of iron deficiency anemia. Tubes were transported to the laboratory of the hospital. Results of the laboratory tests were evaluated when available.

Results: The average age of the patients was 28.17±5.07 years. Sensitivity, specificity, PPV, NPV and accuracy of clinical pallor was 94.1%, 51.9%, 40.7%, 96.2% and 62.8% respectively.

Conclusion: Finally, even if hemoglobin or hematocrit levels cannot be measured directly, clinical pallor examination can still be performed. This is a good way to tell if a person is suffering from severe anemia. Clinical pallor of the palms is superior than clinical pallor of the buccal mucosa, nail bed, or conjunctiva in the diagnosis of mild and severe anemia in children. Nail bed and conjunctival clinical pallor is less common. Medical professionals who are new to clinical pallor might learn about its diagnosis and management by observing it from multiple angles.

INTRODUCTION

One-third of the world's population is affected by anemia, and the vast majority of those who suffer from it live in developing countries. Anemia affects 90.1% of Pakistani pregnant women, according to one study.^[2] Anemia has traditionally been diagnosed by examining a person's eyes, nail beds, face, palms, and palmer wrinkles.^[3] It is possible to use these colors on people of different racial backgrounds, but not on people of different skin tones. Current research suggests that the color of a person's whites of the eyes, rather than their palms or nail beds, is a stronger sign of whether or not they have anemia.^[4] According to the findings of this study, people with severe anemia are more likely to exhibit conjunctival pallor. Since this is the case, it could be more sensitive than other symptoms.

Medical professionals continue to hunt for signs of anemia despite the fact that it may be easily diagnosed with a traditional Sahli's haemoglobinometer or more recently, an electronic cell counter. It's much more of a problem because anemia is so easily diagnosed.

As a screening tool, clinicians typically use a clinical examination of pallor. A hemoglobin test is often ordered if a physician notices pallor at one or more of the patient's examination locations.

This is especially true in the crowded outpatient departments of public hospitals, where the majority of doctors either lack the appropriate equipment or do not believe it is worth their time and effort to accurately estimate the hemoglobin level of their patients.

^[7] It is possible to tell if someone has anemia by looking at the color of their eyes. 69.9% of the time it is correct, and 91.3 % of the time it is correct^[8].

However, having a fair skin tone might be useful in certain situations. For example, doctors commonly see individuals in the

clinic who have a low risk of anemia, therefore a hemoglobin test would not be reasonable to order. Anemia is more likely in patients who have pale conjunctiva, so a hemoglobin level test is recommended if they have this symptom. For example, if a doctor suspects anemia in a patient and then notices that the patient's eyes are pale during a physical exam, the likelihood that the patient has anemia increases. This is because doctors are more prone to anemia than the average person.

Having a physical sign that can detect whether or not a patient has anemia could be helpful during an evaluation of a patient. Mucous membranes, for example, can reveal whether or not a person is anemic. To accurately identify whether a person has anemia, the color of their mucous membranes' skin should have a chance ratio of greater than ten. Patients with anemia have an 82% chance of acquiring anemia when their eyes are pale during a physical exam. This is because anemia is more likely to develop in patients with anemia than in those with normal eyesight.

Even though blood hemoglobin levels are commonly used to gauge the severity of anemia, the process of measuring them can be time-consuming and expensive. On the other hand, there is a test for conjunctival pallor that is simple, quick, and inexpensive. The results of our investigation could be used to develop an alternate technique of diagnosing anemia in women with different skin tones than those in our study, if clinical pallor is a reliable indicator of anemia in women. As a result, better risk assessment and patient management will be achieved.

METHODOLOGY

The College of Physicians and Surgeons of Pakistan granted permission for this inquiry to be conducted. Ward 8 of the Department of Gynecology and Obstetrics of the Jinnah Postgraduate Medical Centre in Karachi was used for the

relocation of the patients. Patients who met the study's criteria for participation and provided written consent were included in the trial. The patient's baseline characteristics were gathered via a questionnaire filled out by the researcher. The questionnaire was then filled out by the researcher. Hemoglobin concentrations in the patient's blood were recorded in the investigation's chart as the reference variable. On the same day five milliliters of blood was drawn from a convenient peripheral vein into plain tubes for assessment of iron deficiency anemia. Tubes were transported to the laboratory of the hospital. Results of the laboratory tests were evaluated when available. Anemia was labeled as per operational definition and was noted in Performa by researcher.

Data was analyzed by using SPSS Version 20. In descriptive statistics Mean ± SD was calculated for variables like maternal age, gestational age and HB. Frequency and percentages was calculated for variables like parity, religion, ethnic background, area of residence, family income level.

2X2 table was constructed to calculate sensitivity, specificity, PPV, NPV and DA keeping anemia detected on blood hemoglobin as gold standard. Stratification was done with respect to maternal age, gestational age, parity, religion, ethnic background, area of residence, family income level. Post stratification 2x2 table was used to calculate sensitivity, specificity, NPV, PPV and Diagnostic Accuracy.

RESULTS

A total of 393 female patients attending antenatal care in OPD and Emergency Clinic, were included in this study. The average age of the patients was 28.17±5.07 years. Out of 393 cases, 80(20.36%) had nulliparous and 313(79.64%) had multiparous. Ethnic class of the patients is presented in figure 1. 96.44% of the cases were Muslim. Urban cases was 52.16% and rural was 47.84%. Monthly status of the family is also presented in figure.

Rate of anemia was observed in 26% (102/393) cases confirmed by HB test. Sensitivity, specificity, PPV, NPV and accuracy of clinical pallor was 94.1%, 51.9%, 40.7%, 96.2% and 62.8% respectively. Stratification analysis with respect to age, gestational age, Parity, religious, residence, ethnic groups and family income was performed and observed that diagnostic accuracy was between 50% to 71.8%.

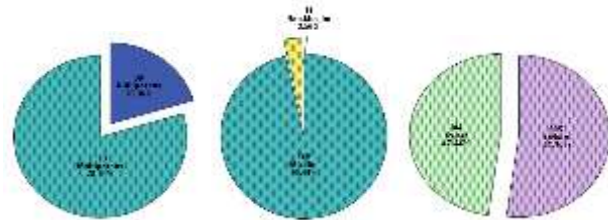


Figure 1: The figures show parity distribution, religions as well as the residence of the patients

Table 1:

Clinical Pallor	DIAGNOSTIC ACCURACY OF CLINICAL PALLOR TO DETECT ANEMIA AMONG																	
	Females		Females <_30 years of age		Females >30 years of age		Female patients for <36 weeks gestational age		Female patients for ≥36 weeks gestational age		Female patients for nulliparous		Among female patients for multiparous		Female patients for muslim		Female patients for non muslim	
	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
+ve	96 (TP)	140 (FP)	80	114	16	26	92	124	4	16	21	21	65	119	91	137	5	3
-ve	6 (FN)	151 (TN)	6	126	0	25	6	121	0	30	2	26	4	125	5	146	1	5
Total	393		326		67		343		50		80		313		379		14	

Table 2:

Clinical pallor	DIAGNOSTIC ACCURACY OF CLINICAL PALLOR TO DETECT ANEMIA AMONG																	
	Female patients for urban		Among female patients for rural		Female patients for sindhi		Female patients for panjabi		Female patients for balochi		Female patients for pathan		Female patients for <10,000		Female patients for 10,001 to 20,000		Female patients for >20,000	
	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
+ve	31	90	65	50	21	25	32	67	16	24	11	10	23	29	63	75	10	36
-ve	3	81	3	70	0	31	3	38	0	30	0	21	4	19	2	96	0	36
Total	205		188		77		140		70		42		75		236		82	

Table 3

Factor	DIAGNOSTIC ACCURACY OF CLINICAL PALLOR TO DETECT ANEMIA AMONG FEMALE PATIENTS FOR (%)																	
	≤30 years of age	>30 years of age	<36 weeks gestational age	≥36 weeks gestational age	Nulliparous	multiparous	muslim	Non-muslim	Urban	Rural	Sindhi	Panjab	Balochi	Pathan	<10,000	10,001 to 20,000	>20,000	
sensitivity	93	100	93.9	100	93.9	94.2	94.8	83.3	91.2	95.6	100	91.4	91.4	100	85.2	96.9	100	
specificity	52.5	49	49.4	65.2	55.3	51.2	51.6	62.5	47.4	58.3	55.4	36.2	36.2	67.7	39.6	56.1	50	
PPV	41.2	38.1	42.6	20	59.3	35.3	39.9	62.5	25.6	56.5	45.7	32.3	32.3	52.4	44.2	98	21.7	
NPV	95.5	100	95.3	100	92.9	96.9	96.7	83.3	96.4	95.9	100	92.7	92.7	100	82.6	45.7	100	
Accuracy	61.3	61.2	62.1	68	58.7	60.7	62.5	71.4	54.6	71.8	67.5	50	65.7	76.2	56	67.4	56.1	

DISCUSSION

It is anemia when a person has less haemoglobin (Hb) in their blood than is considered healthy for their age and gender. This medical condition is called anemia. Adult men must have hemoglobin levels of at least 13 g/dl to be diagnosed with anemia, while women must have hemoglobin levels of at least 11.5 g/dl to be diagnosed with anemia. [89] If your hemoglobin is less than 7 grams per deciliter, you have severe anemia. [90] Anemia is a common problem among hospitalized patients. Between 30 and 90 percent of the time, it's been found to be the cause. [91] The most common cause of anemia in this population is long-term illness, although iron deficiency is the leading cause of anemia in the world. [89]

The pallor of a patient should be checked to see if anemia is present as part of any complete physical examination. Anemia can be diagnosed by looking for pale patches near the skin's surface where capillaries are situated. Warts are most commonly found on the nailbed, palm, and the inside of the lower eyelid. [92] As part of a screening, physicians frequently examine for pallor in these areas. You'll be informed about your hemoglobin levels if the doctor notices any pallor in any of these areas. Because they are easy to spot and don't cost any money, these signs are particularly useful in less developed countries without the means to assess haemoglobin levels. Many health care professionals and medical students are not aware that paleness is a reliable predictor of anemia. When describing a patient with a pale skin, the term "anemic" is sometimes used. As a result of ward rounds and

clinical teaching, pallor is frequently discussed. Pallor can also be caused by medical conditions such as low blood pressure, low thyroid function, and related difficulties in more typical settings.^[93]

The average age of participants in this study was 28.175.07 years at the time of participation. The total number of births was 393; 80 of these were single births (20.36 percent), while the remaining 313 were multiple births (80.36 percent) (79.64 percent). More than 390 adults over the age of 12 participated in the study done by Kalantri et al (1994). They were aged 12 to 87, with an average of 40.1 [SD] 17 years and a 17-year standard deviation.

The probability ratio was chosen as the metric of choice for measuring the reliability of clinical signals. When it comes to identifying anemia, only a few studies have used probability ratios, as contrast to many others that have focused more on sensitivity and specificity [95,96]. [97,98] The likelihood ratio has two advantages that should be taken into account. While doing a medical exam, the attending physician is given an indication of whether or not the patient has an underlying medical condition. For one thing, if you know the likelihood of having an illness before the test, it will tell you the probability of having the disease after the test (post-test odds = pre-test odds LR, and probability = odds/1+odds)."^[99]

The HB test indicated that anemia was found in 26% of the individuals who participated in this study. 62.8 percent of the time, a person's pallor could be used to determine whether or not they had anemia. When Chandrasekaran et al.^[100] conducted their investigation, they found that sensitivity was at 80% and specificity at 82%. Diagnostic sensitivity and specificity of 92% and 62%, respectively, were found for detecting mild anemia in the form of yellowing of the palms and soles of the feet and the nail beds (sensitivity of 90 percent and specificity of 66 percent). Conjunctival pallor is the best indication of mild anemia, with a sensitivity of 82 percent, according to the study.

Evidence suggests clinical indicators have a sensitivity of 19–70% and specificity of 70–100% when estimating their accuracy^[101, 102, 103]. There was previously published research that led to these conclusions. It was discovered by Nardone et al.^[102] that anemia could not be accurately predicted based on the color of the eyes (LR+2.33) or the skin tone (LR+2.52) at a haematocrit cutoff threshold of 0.30. The haematocrit cutoff point was utilized to identify whether or not anemia was present. Despite the inclusion of all four anatomical locations (eyelid, tongue, palm, and nailbed), pallor has not been proved to be a more informative test. It has a sensitivity and specificity of 76% and 59% and 64% at a haemoglobin threshold of 7 g/dL, respectively.

Researchers have studied the accuracy of these symptoms as a basis for diagnosing anemia. The vast majority of these tests are conducted on children in underdeveloped countries, where anemia is a common problem.^[105-109] According to a meta-analysis of 11 similar studies^[110], the pallor of the palms and the pallor of the nailbeds are the two best ways to assess if a child has severe anemia. No single area has been found to be the best place to check for anemia in adults over the age of 12. The conjunctiva, the tongue, and the palm are the best places to look for signs of severe anemia (Hb 7 g/dl). The lack of sensitivity and specificity of these sites to detect a minor case of anemia (Hb 12 g/dl) was also a problem.^[90, 96, and 111]

CONCLUSION

Finally, even if hemoglobin or hematocrit levels cannot be measured directly, clinical pallor examination can still be performed. This is a good way to tell if a person is suffering from severe anemia. Clinical pallor of the palms is superior than clinical pallor of the buccal mucosa, nail bed, or conjunctiva in the diagnosis of mild and severe anemia in children. Nail bed and

conjunctival clinical pallor is less common. Medical professionals who are new to clinical pallor might learn about its diagnosis and management by observing it from multiple angles.

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