

Research Article

Validation of different tests for haemoglobin estimation

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Abstract

Primary health center, urban health center and district hospital rely on Sahali's method for hemoglobin estimation. Sahali's acid hematin method is still in vogue used, in spite of availability of more reliable and accurate methods. Sahali's acid hematein method though effective and easy is not sufficiently accurate because it shows wide scatter in inter observers and intra observer result distribution. For good ethical laboratory practices it's needed to develop the variability accuracy precision of hemoglobin estimation by Sahali's acid hematin method compared to Drabkin's cyanmethemoglobin method as per guidelines by ICMR. Hence the present study was undertaken for standardizing the hemoglobin result in district hospital laboratory.

Objectives: Observe the inter-observational result variation using the Sahali's method of Hemoglobin estimation and to validate the accuracy & precision of hemoglobin estimation by Sahali's method as compared to Drabkin's method.

Material & Methods: This is a prospective hospital based study. 51 subjects from OPD were included in the study and duration of the study was 2 months. Sample for hemoglobin estimation was collected from the subjects in 3 different bottles and divided into group A, B & C according to the method of estimation.

Results: Sahli's method of estimation in the samples by two different groups of workers showed a significant difference. Comparison of haemoglobin estimated by Sahli's and Drabkin's method by finger prick and venepuncture method of collection not showed a significant difference.

Keyword: Hemoglobin, Sahli's method, Rural based hospital

1. Introduction

Primary health center, urban health center and district hospital rely on Sahali's method for hemoglobin estimation¹. Sahali's acid haematin method is still in vogue used, in spite of availability of more reliable and accurate methods. Sahali's acid hematein method though effective and easy is not sufficiently accurate because it shows wide scatter in inter observers and intra observer result distribution². For good ethical laboratory practices it's needed to develop the variability accuracy precision of hemoglobin estimation by Sahali's acid haematin method compared to Drabkin's cyanmethemoglobin method as per guidelines by ICMR. Hence the present study was undertaken for standardizing the hemoglobin result in district hospital laboratory.

2. Methodology

2.1 Study design: This is prospective hospital based study.

2.2 Inclusion criteria: The subjects including in the study will be patients from OPD / IPD.

2.3 Exclusion criteria: None as the subjects need to participate for once only.

2.4 Duration of the study: 2 months.

2.5 Statistical analysis: SPSS version 16.0 software

2.6 Study plan: Sample for hemoglobin estimation will be collected from the subjects in 3 different bottles and divided into:

Group A: Hemoglobin estimation will be done by Sahali's method by a person in the pathology laboratory (obg-gyn opd) of the hospital. The sample was collected by finger prick.

Group B: Hemoglobin estimation will be done by Sahali's method by a trained technician of the department of physiology. The sample was collected by finger prick.

Group C: Hemoglobin estimation will be done by Drabkin's method in the department of pathology. The sample was collected by venepuncture.

a) The result of the hemoglobin estimation done at 3 places will be collected & will be subjected for statistical analysis for:

- Inter observational variations in Sahali's method
- Variations observed on using Sahali's method & Drabkin's method.
- Precision & accuracy of the Sahali's method

3. Results

Total 51 subjects were included in the study. Sahli's method of estimation in the samples by two different groups (Group A & Group B) of workers showed a significant difference. (Table1)

Table 1: Comparison of Group A and Group B

Groups	N	Hemoglobin (gm %) Mean \pm SD	Significance
A	51	10.10 \pm 1.41	P= 0.012(< 0.05)
B	51	10.64 \pm 1.76	

Comparison of haemoglobin estimated by Sahli's (Group A) and Drabkin's method (Group C) by finger prick and venepuncture method of collection did not show a significant difference. (Table 2)

Table 2: Comparison of Group A and Group C

Groups	N	Hemoglobin (gm %) Mean \pm SD	Significance
A	51	10.10 \pm 1.41	P= 0.079
C	51	10.62 \pm 1.93	

Comparison of haemoglobin estimated by Sahli's (Group B) and Drabkin's method (Group C) by finger prick and venepuncture method of collection did not show a significant difference. (Table 3)

Table 3: Comparison of Group B and Group C

Groups	N	Hemoglobin (gm %) Mean \pm SD	Significance
B	51	10.64 \pm 1.76	P= 0.954
C	51	10.62 \pm 1.93	

4. Discussion

Studies have compared haemoglobin estimated by different methods in order to establish the efficacy and reliability of the methods.^{5,6} Lewis study showed that some of the methods of haemoglobin estimation may have an error of + / -20% or more which when compounded with poor technique makes the method highly unreliable.⁷

The principle in Sahli's method involves the conversion of haemoglobin to acid hematin and comparing visually the colour developed with that of standard tinted glass. Haemoglobin value is directly read from the graduated haemoglobin tube. The methodology has following inbuilt disadvantages viz: i) subjective visual colour comparison, ii) need for accurate pipetting of 20 microliter of blood, iii) estimation of only acid hematin formed, iv) fading of comparator on prolonged use and v) poor sensitivity and reliability.

In the Drabkin's method of haemoglobin estimation haemoglobin is oxidised to methemoglobin by potassium ferricyanide, which reacts with cyanide ions of potassium cyanide to form cyanmethemoglobin. The haemoglobin is estimated with the help of cyanmethemoglobin curve. The advantages of this method are i) error due to subjective visual matching is avoided as spectrophotometer is used and hence reading is precise and reliable, ii) measures all forms of haemoglobin except sulfhemoglobin. iii) Single step procedure using single reagent. iv) cyanmethemoglobin formed produces broad absorbent band at 530 nm v) good stable haemoglobin standards are available.

In the present study, on comparing Sahli's method of estimation in the samples by two different groups (Group A & Group B) of workers showed a significant difference. This may be due to above mentioned disadvantages of Sahli's method of hemoglobin estimation.

On comparing haemoglobin estimated by Sahli's (Group A) and Drabkin's method (Group C) by finger prick and venepuncture method of collection not showed a significant difference.

On comparing haemoglobin estimated by Sahli's (Group B) and Drabkin's method (Group C) by finger prick and venepuncture method of collection not showed a significant difference.

Thus Inter observational variations in Sahli's method was significant but on comparing Sahli's and Drabkin's method of hemoglobin estimation there was no significant difference observed in our study.

5. Conclusion

The above study encourages use of Sahli's method for haemoglobin estimation which is cheaper and readily available especially in rural setups of India. The degree of precision and accuracy of the method is fair. The inbuilt disadvantages of the method can be reduced by proper training of the person actually performing the test.

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