Hematological profile of sickle cell disease from South Gujarat, India

Sanjeev Shyam Rao, Jagdish Prasad Goyal, S.V. Raghunath, Vijay B. Shah
Department of Pediatrics, Govt Medical College, Surat, Gujarat, India

Abstract

The aim of this study was to determine hematological profile of sickle cell disease (SCD) from Surat, South Gujarat, India. This prospective cross-sectional study was conducted in the Department of Pediatrics and Sickle Cell Anemia Laboratory, Faculty of Pathology, Government Medical College, Surat, India, between July 2009 and December 2010. Patients included in this study were in their steady state for a long period of time without any symptoms related to SCD or other diseases. Subjects who have been transfused in the last 3 months were excluded from the study.

Detail history was elicited to obtain information on all SCD related symptoms. Most of the blood samples are collected during Outpatient Department visit. Venous blood of all patients was collected in ethylenediaminetetraacetic acid and hematological indices were measured. Thirty-three subjects homozygous in all were studied for their hematological parameters for sickle cell anemia. Moderate to severe anemia, low mean cell volume and high foetal hemoglobin dominate the hematological profile of SCD children.

Statistical analysis

Data was recorded on a pre-designed Performa and managed on Excel spread sheet. All the entries were double checked for any possible key-board error. Statistical analysis was done by unpaired t-test with the help of Epi info 6 (CDC, Atlanta). In this study P<0.05 was considered as statistically significant.

Results

A total of 33 subjects homozygous (SS) (mean age 9.6±3.2 years) for sickle cell anemia was studied for their hematological parameters. Out of the total SS subjects, 24 were males and 9 were females. Males outnumbered females sex ratio: 2.6. Age ranged from 5 years to 15 years. Mean (SD) age of male was 9.5 (3.19) years whereas SD age of female was 9.89 (3.89) years. Hematological profile of study subjects are shown in Table 1.

Discussion

There were more male as compared to females in the present study, which may be due to the fact that male child gets more attention as compared to female child. Total hemoglobin (Hb) is low in SCD patient more so in females as compared to males although this is not statistically significant (P>0.05) This may be due to hemolysis, blood loss due to hematuria, repeated infections, and nutritional deficiencies because of low socio-economic status. According to National Family Health survey, anemia is common in India among the schedule cast and tribes and among the children with low socio-economic status. Total red cell count count, mean cell hemoglobin (MCH) and mean cell hemoglobin concentration (MCHC) are low in our study which is comparable to other studies. Mean cell volume (MCV) is low in our study as compared to other studies. Usually MCV is high in SCD patients because of the increasing need of erythropoiesis due to chronic hemolysis leading to macrocytosis. It would also be related to a folic acid deficiency. Low MCV in our study as compared to other study may be due to co-existing iron deficiency anemia and other unknown factors such as -thalassemia which is frequent and often associated to SCD. The -thalassemia levels, which fails to copolymerize with abnormal hemoglobin (Hbs), is associated with high HbF levels, which fails to copolymerize with abnormal hemoglobin (Hbs). The difference in level of HbF values was observed in present study (P>0.05). Although HbF value (12.3%) was higher than in African study yet it was low as compared to Indian studies. Indian patients usually carry Arab-Indian haplotype, which is associated with high HbF levels, which fails to copolymerize with abnormal hemoglobin (Hbs). The difference in level of different studies may be due to coinheritance trait of or thalassemia gene or a strong genetic component and clinical status of the patients.

Conclusions

We conclude that moderate to severe anemia, low MCV and high HbF dominate the hematological profile of South Gujarat SCD children.
### Table 1. Hematological comparison between male and female sickle cell patients (n=33).

|                  | Male (n=24) | Female (n=9) | Total | P  |
|------------------|-------------|--------------|-------|----|
|                  | Mean ± SD   | Mean ± SD    | Mean ± SD |    |
| Hb (g/dL)        | 7.86±1.87   | 7.41±1.92    | 7.73±1.86| 0.55|
| HCT (gm/dL)      | 27.35±3.84  | 26.39±7.69   | 27.09±5.05| 0.63|
| RBC (mill/mm³)   | 3.61±0.96   | 2.95±0.96    | 3.43±0.99| 0.09|
| MCV (fL)         | 76.00±5.67  | 75.67±5.87   | 75.90±5.63| 0.88|
| MCH (pg)         | 26.61±2.21  | 25.99±1.62   | 26.30±2.12| 0.45|
| MCHC (g/dL)      | 32.84±1.04  | 32.94±0.83   | 32.96±0.97| 0.76|
| HbF (%)          | 12.56±7.60  | 11.97±6.68   | 12.2±7.1 | 0.83|
| WBC (× 10³ µL)   | 10.6±6.3    | 14.3±5.9     | 11.6±6.4 | 0.14|

Hb, hemoglobin; HCT, hematocrit; RBC, red cell count; MCV, mean cell volume; MCH, mean cell hemoglobin; MCHC, mean cell hemoglobin concentration; HbF, fetal hemoglobin; WBC, white blood cells.

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