Sickle cell anemia morbidity in Northern Saudi Arabia

George I. Izuora, MD, *Saad N. Al-Dusari,* MBBS, DCH, *Yisa M. Fakunle,* MD.

ABSTRACT

Objectives: Documentation of the morbidity in sickle cell patients presenting at the Northern Area Armed Forces Hospital, Hafr Al Batin, Kingdom of Saudi Arabia and the burden of delivering care to these patients.

Methods: The record charts of all Saudi patients with Sickle Cell Anemia (SCA) admitted between June 1994 through to July 2001 were retrospectively analyzed. Focus was on age of patients, frequency of admissions, duration of hospital stay and requirements for blood transfusions.

Results: The study embraced a total of 84 patients (53 males and 31 females) giving a male to female ratio of 1.7:1. The mean age of patients was 10.8 years while the mean age at first admission was 3.8 years. The frequency of admissions peaked at 754 admissions (51%) in the age group 8-15 years and 326 (22%) admissions in the age group 4-8 years. The most frequent causes for admissions were in order of frequency, pain crisis, hemolysis, infections and anemia. Maximum hospitalization occurred in the age group 12-18 years. In 415 occasions admission of patient lasted for only one day; in 470 instances for 2 days and in 166 patients for 3 days. These gave a total of 3945 patient days of which 1255 days (31.8%) were for 2 days or less.

Conclusion: Many of our patients were admitted for very short periods of stay in the ward for pain control, rehydration or blood transfusions. Costs can be reduced by managing them in a short stay ward. It would be helpful if a National Guideline for Management of Patients with SCA can be drawn up by a Committee of Clinical Hematologists and Clinicians with wide experience in management of patients with hemoglobinopathies. Such guidelines will aid Internists and Primary Health Care Physicians in smaller hospitals in the management of patients with SCA.

Saudi Med J 2003; Vol. 24 (3): 269-272

Sickle Cell Anemia (SCA) is one of the most frequent hemoglobinopathies in the world.[1] El-Hazmi and Warsy[2] determined that the "S" gene frequency is 0% in the Kingdom of Saudi Arabia (KSA) being the highest in the Eastern province and lowest in the Central and Northern provinces. The prevalence of the homozygous state is 1.1% and 7.4% for heterozygous. The prevalence of hemoglobin electrophoresis (HbSS) is 0.3% in Hafr Al Batin in the Northern region.[2] Prevalence of the disease is likely to increase nationwide until control measures such as premarital screening and genetic counseling become more effective in reducing gene frequency in the long term. Attention at the present time has to be directed to efficient and effective management of these patients.

We report here on the morbidity profile of patients presenting in our specialist secondary care facility with SCA with particular focus on frequency of admissions, duration of hospital stay and requirement for blood transfusions. Efficacious modes of delivering care to these patients are reflected upon.

Methods. The files of all Saudi patients with SCA HbSS admitted between June 1994 through to July 2001

From the Department of Pediatrics (Izuora, Al-Dusari) and the Department of Medicine (Fakunle), Northern Area Armed Forces Hospital, King Khalid Military City, Hafr Al-Batin, *Kingdom of Saudi Arabia*.

Received 11th August 2002. Accepted for publication in final form 11th December 2002.

Address correspondence and reprint request to: Dr. Yisa M. Fakunle, Northern Area Armed Forces Hospital, King Khalid Military City, PO Box 10018, Hafr Al-Batin 31991, *Kingdom of Saudi Arabia*. Tel. +966 (3) 7871777 Extn. 2221. Fax. +966 (3) 7871382. E-mail: fola@sahara.com.sa

were reviewed. Information on sex, age at admission, clinical presentation, number and frequency of admissions as well as duration of hospital stay and treatment given were extracted from the files. The hemoglobin level at the time of transfusion and number of occasions patients were transfused were documented. The number of times each patient was admitted and the number of days spent in the hospital were added in the different age groups.

Results. ***Age and sex distribution.*** There were a total of 84 patients (53 males and 31 females) with SCA in the 7-year period **Table 1**. This gives a male to female ratio of 1.7:1. Fifty five patients (65%) were below the age of 12 years; 22 (26.2%) were between the ages of 12-18 years and the remainder, 8.3% above 18 years old. The mean age of patients was 10.8 years while the mean age at the first admission was 3.8 years. In 31% of cases the first admission had already taken place by the end of the first year of life and by 2 years of age more than half of the children had been admitted at least once to the ward for medical care. Three quarters of the patients had been hospitalized for sickle cell morbidity in the 7 year study period.

Frequency of admissions. **Table 2** shows the frequency of admissions (cumulative days) with a peak of 754 admissions (51%) in the age group 8-15 years. This was followed by patients in the age groups 4-8 years with 326 (22%) admissions.

Reasons for admissions. The most frequent causes for admissions were pain crises, hemolysis, infection and anemia **Table 3**. Quite often patients present with combinations of these causes. **Table 4** displays the number of admissions due to pain crises: patients in the age group 12-15 years were admitted on 222 (27.4%) occasions for pain control followed by children in the 4-8 years age group (23.6%) and 8-12 years old (22%). **Table 5** shows the frequency of blood transfusion in each age group for reasons of acute or low-grade hemolysis with lower hemoglobin than the patients' steady state hemoglobin.

Duration of cumulative hospital stay. Maximum hospitalization occurred in the age group 12-18 years old **Table 6.** There were 415 occasions when patients were admitted to the ward for one day or less and in 470 instances the duration of hospital stay was no more than 2 days. Thus, in 885 instances of admissions it was for 2 days or less. In 166 occasions patients remained in the wards for 3 days. The total number of days spent in hospital by the patients was computed to be 3946 patient days, of which, 1255 days (31.8%) were for 2 days or less.

Discussion. Our analysis shows that the majority of admissions occurred in the 12-18-years-old. Fifty percent of admissions were for control of vaso occlusive pain crises. Majority of these patients received intravenous saline or dextrose saline infusion, (as many

Table 1 - Age ranges of patients.

Ages ranges in years	Male	Female	Total	Total (%)
0-4	9	4	**13**	**(15.5)**
>4-8	15	7	**22**	**(26.2)**
>8-12	12	8	**20**	**(23.8)**
>12-15	9	5	**14**	**(16.7)**
>15-18	5	3	**8**	**(9.5)**
>18-30	2	3	**5**	**(5.9)**
>30	1	1	**2**	**(2.4)**
Total	**53**	**31**	**84**	**(100)**

Table 2 - Frequency of admissions.

Ages ranges in years	Male	Female	Total	Total (%)
0-4	43	14	**57**	**(3.9)**
>4-8	264	62	**326**	**(22)**
>8-12	156	223	**379**	**(25.6)**
>12-15	316	59	**375**	**(25.4)**
>15-18	169	37	**206**	**(13.9)**
>18-30	60	43	**103**	**(7)**
>30	8	24	**32**	**(2.2)**
Total	**1016**	**462**	**1478**	**(100)**

Table 3 - Reasons for admissions.

Single admissions	Total	Total (%)
Pain crisis	**487**	**(24)**
Hemolytic crisis	**340**	**(16.8)**
Infection	**160**	**(7.9)**
Trauma/Elective Surgery	**20**	**(1)**
Anemia/Transfusion	**1020**	**(50.3)**
Total	**2027**	**(100)**

Table 4 - Admissions due to pain crises.

Ages ranges in years	Male	Female	Total	Total (%)
0-4	23	4	**27**	**(3.3)**
>4-8	143	48	**191**	**(23.6)**
>8-12	91	87	**178**	**(22)**
>12-15	142	80	**222**	**(27.4)**
>15-18	67	26	**93**	**(11.5)**
>18-30	39	44	**83**	**(10.3)**
>30	5	10	**15**	**(1.9)**
Total	**510**	**299**	**809**	**(100)**

Table 5 - Frequency of blood transfusions.

Ages ranges in years	Male	Female	Total	Total (%)
0-4	38	12	**50**	**(4.4)**
>4-8	98	44	**142**	**(12.6)**
>8-12	174	148	**322**	**(28.6)**
>12-15	173	147	**320**	**(28.4)**
>15-18	179	41	**220**	**(19.6)**
>18-30	29	30	**59**	**(5.2)**
>30	6	7	**13**	**(1.2)**
Total	**697**	**429**	**1126**	**(100)**

Table 6 - Duration of cumulative hospital stay in days.

Ages ranges in years	Male	Female	Total	Total (%)
0-4	115	34	**149**	**(3.8)**
>4-8	383	125	**509**	**(12.9)**
>8-12	351	307	**658**	**(16.7)**
>12-15	772	506	**1278**	**(32.4)**
>15-18	57	188	**745**	**(18.9)**
>18-30	271	167	**438**	**(11)**
>30	42	127	**169**	**(4.3)**
Total	**1991**	**1454**	**3946**	**(100)**

were assessed clinically to be dehydrated) as well as analgesics. Paracetamol, Diclofenac sodium (Voltaren R) or Pethidine were the most frequent analgesic prescriptions. None of the patients was on hydroxyurea a drug that has been shown to suppress sickle cell hemoglobin gene expression and encourage fetal hemoglobin production and to reduce frequency of pain crises.[3,4] Apart from prophylactic penicillin administered routinely to many younger patients below 5 years of age, antibiotics prescription were dictated by the clinical situation. Eighty patients (95.2%) received packed cells/blood transfusions at one time or the other over the period of review. Seventy-one patients (84%) who received blood transfusions had hemoglobin of between 4.5 gm/dl and 7 gm/dl. In 9 patients (15%) the hemoglobin level was above 7 gm/dl. In addition to blood transfusions specific treatments were offered to patients who required surgery and other non-sickle cell related disorders.

On the whole, there were 1126 cases of packed cell transfusions **Table 5**. The ideal level of hemoglobin to warrant "top up" transfusion has not been determined. Many physicians will arbitrarily draw a line of 5-6 gms/dl above which they will not transfuse except there are clear indications such as heart failure or a sharp drop from the steady state hemoglobin of the patient,[5] or an indication for exchange transfusion. Blood transfusions above 7 gm/dl were often indicated in patients requiring surgery. This was also considered necessary for some patients with severe infection and those who were prone to cerebrovascular accidents.

From our analysis, there were 415 single occasions when patients were admitted for less than one day. Majority of them were for pain crises control. They required analgesics, rehydration and packed cell transfusion or both. It is computed that if the inpatient charges were taken to be minimal, Saudi Riyals (SR) 500 per day without therapy cost for example. blood products; this will translate to SR 677000 for this short term admissions. If these patients can be managed in a dedicated short stay area in the Emergency Room or Day Care Unit and discharged within one day, this would lead to substantial savings in costs without compromising the quality of care given to such patients. Such "fast track" admission program has been shown in one study to be cost-effective and indeed preferred by parents.[6] Davies and Oni[7] have shown that through judicious use of analgesics for vaso occlusive crises in a stepladder pattern at home by parents of younger patients, the frequency of hospital admissions and therefore costs can be reduced. The prevalence and importance of this well defined inherited genetic disorder will increase as communicable diseases are brought under control and SCA patients live longer due to improved care. The above analysis shows that the disease constitutes considerable burden on patients and health resources. Although marrow transplantation can in theory cure the disease, this has its drawbacks and is not inexpensive.[8,9] Gene therapy is at present not an option. Public

education regarding the disease and genetic counseling before marriage is a certain way of reducing homozygous S gene in the society. Both of these measures require governmental involvement for effective implementation.

It would be helpful if a Committee of Clinical Hematologists and Clinicians with wide experience in the management of patients with SCA and β-thalasemia can draw up a National Guideline for the Management of Patients with SCA. Such guidelines will be particulary helpful in Centers where the care of these patients falls on the General Internists or General Practitioners. The Committee would address and make recommendations on the use of hydroxyurea, analgesics, antibiotics, optimal levels to maintain hemoglobin, and management of patients in short stay wards. Their recommendations of course, will not compromise the quality of care given to these patients and could possibly lead to reduction of costs.

Acknowledgment. We are grateful to Ms. Evelyn Tan for excellent clerical and secretarial duties.

References

1. Serjeant GR, Sickle Cell Disease. ***Lancet*** 1997; 350: 725-730.
2. El-Hazmi MAF, Warsy AS. The Sickle Cell gene as a multifactorial problem in Saudi Arabia. ***Saudi Med J*** 1997; 18: 400-404.
3. Charache S, Terrin ML, Moore RD, Dover GJ, Barton FB, Eckert SV et al. Effect of hydroxyurea on the frequency of painful crises in Sickle Cell Anaemia. ***N Engl J Med*** 1995; 332: 1317-1322.
4. Ferster A, Vermylen C, Cornu G, Buyse M, Corazza F, Devalck C et al. Hydroxyurea for treatment of severe Sickle Cell Anaemia: a Pediatric clinical trial. ***Blood*** 1996; 88: 1960-1964.
5. Davies SC, Roberts-Harewood M. Blood transfusion in sickle cell disease. ***Blood Rev*** 1997; 11: 57-71.
6. Fertleman CR, Gallager A, Rossiter MA. Evaluation of fast track admission policy for children with Sickle Cell crises: Questionnaire Survey of Parent's Preferences. ***BMJ*** 1997; 315: 650.
7. Davies SC, Oni L. Management of Patients with Sickle Cell Disease. ***BMJ*** 1997; 315: 656-660.
8. Walters MC, Patience M, Mentzer WC, Leisenring W, Davies SC, Eckman JR et al. Bone marrow transplantation for sickle cell disease. ***N Engl J Med*** 1996; 335: 369-376.
9. Al-Mukharraq HJ, Mohammad, AM. Bone Marrow Transplantation in haemoglobinopathies. ***Bahrain Medical Bulletin*** 1997; 19: 89-90.