

Acute Phase Reactants and Haematological Alterations in Children with Sick Cell Disease

Hussain Ali Abu Srair, FRCP(C), FAAP*

Ali Magzoub El-Bashier, MRCPath**

Hussain Ama, MD*

Mohamed Al-Khater, MD*

ABSTRACT

A prospective study was conducted on a hundred and thirty two paediatric patients with sickle cell disease who were admitted to Qateef Central Hospital between January 1st 1992 through December 31st 1992. Twenty eight patients had documented bacterial infection (Group A), and out of these, 11 had osteomyelitis, 9 had chest infection, 1 had urinary tract infection, 1 had salmonella septicaemia and 6 had acute follicular tonsillitis. One hundred and four patients (Group B) had painful vaso-occlusive crisis.

In group A, the mean erythrocyte sedimentation rate was 50mm/h, while it was 29mm/h in Group B, ($P < 0.01$). The means of absolute band cell count of both groups were 1300/ul and 480/ul respectively ($P < 0.01$). The C-reactive protein was significantly positive in 12 patients in Group A (42%), while it was positive in only 9 patients (8.6%) in Group B ($P < 0.01$). The mean age group A was 6.4 year, while it was 8 years in Group B ($P < 0.001$).

There was no significant difference between both groups in their mean admission temperature, total leukocyte count and absolute neutrophil count.

Children with sickle cell disease are at a high risk of acquiring bacterial infections responsible for significant mortality^{1,2,3}. In Saudi Arabia, particularly the Eastern Province, sickle cell disease is a common health problem^{4,5}. In children with sickle cell disease, it is sometimes difficult to distinguish between painful vaso-occlusive crisis and infections because of similar symptom aetiology and plain film radiography^{3,6,7}. Acute phase reactants

such as C-reactive protein, C3 and other have been used as laboratory indication for presence of infection but the results are controversial⁸.

METHODS

Patients between the age of 2-12 years old, who were admitted to Qateef Central Hospital from January 1st 1992 through December 31st 1992, with either painful vaso-occlusive crises or infection were included in the study.

Painful vaso-occlusive crises were defined as pain in the abdomen or in the musculoskeletal system that required hospitalisation with no evidence of associated infection. Infection crises were defined as crises that were associated with evidence of infection at the time of admission such as fever (above 38°C), elevated erythrocyte sedimentation rate ($> 30\text{mm/h}$), and positivity of one of the following: blood culture, urine culture, needle bone aspirate, throat swab, and positive chest and bone radiological findings. All patients had their complete blood count done using the coulter counter, and the differential leukocytic count done manually by the haematologist. The C-reactive proteins were done using CRP latex slide test.

All the patients with vaso-occlusive crises were followed up in the clinic to see the evolution of their crises. The data were analysed using the "t-test".

RESULTS

A total of 132 paediatric patients with sickle cell disease (SS) were admitted to the Paediatric Medical Ward during the study period. Twenty eight patients had documented bacterial infections:- (11 osteomyelitis,

* Department of Paediatrics

**Department of Microbiology

Qateef Central Hospital
Qateef, Saudi Arabia

Table 1
Leukocyte count (total and differential) and CRP in children with sickle cell disease during vaso-occlusive crises and infection

	Number	Mean	Mean	Mean	Mean	Mean	Number	Mean
Infection	28	6.4	14500	8555	1300	50	12	38.4°C
Pain Crises	104	8	16000	8640	480	30	9	37.9°C

9 chest infections, 6 acute follicular tonsillitis, 1 urinary tract infection and 1 salmonella septicaemia) (Group A). The remaining 104 patients had painful vaso-occlusive crises (Group B). The mean age for Group A was 6.4 years, with 13 males and 15 females, while Group B was 8 years with 62 males and 42 females. (P-value for the mean age was $P < 0.001$). The mean erythrocyte sedimentation rate were 50mm/h and 30mm/h for A & B groups respectively ($P < 0.01$). The mean absolute band cell count for Group A was 1300/ul, while that of Group B was 480/ul ($P < 0.01$). 12 patients in Group A (42%) had positive C-reactive protein, while only 9 patients (8.6%) of Group B had positive C-reactive protein ($P < 0.01$).

Table 1 shows the mean admission, leukocytic count, ESR, CRP and temperature.

The mean admission leukocytic count, temperature and absolute neutrophil count was not significantly different in both groups.

DISCUSSION

Serious bacterial infections are a major threat to young children with sickle cell disease. As many as 30% of all deaths among individuals with sickle cell anaemia occur before the age of 5 years, and the majority of these fatalities are due to septicaemia^{1,2,9-11}. So, early identification of bacterial infection in these patients is highly desirable. However, the diagnosis of infection is complicated by several factors. For example, the patient may appear well in the early stages of the disease. Also, the crises in bones, abdomen or in lungs may mimic painful vaso-occlusive crises. The value of laboratory investigations to distinguish between infections and vaso-occlusive crises is uncertain^{8,12}.

So investigators have proposed that elevations of the erythrocyte sedimentation rate or the absolute band cell

count indicate that infection is present^{7,13-16}; as we have shown in our data. However, others found that these tests were relatively insensitive¹². Also, the number of significantly positive C-reactive protein in our patients with infections higher than those with vaso-occlusive crises was similar to studies done by others⁸. Our data also showed that the mean admission leukocytic count and the absolute neutrophil count did not statistically differ in both groups as has been shown by others^{8,16}. As the patients with infections were younger than those with vaso-occlusive crises, which is compatible with the general consensus that sickle cell patients younger than 5 years old are more prone to major infection than older ones^{13,17}.

CONCLUSION

We conclude that the triad of elevated ESR, positive CRP and high absolute band cell count is a good indicator of infection in patients with sickle cell disease.

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