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School Performance of Children and Adolescents with Sickle-cell Anaemia (Sicklers)

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Summary

Ogunfowora OB, Akenzua GI, Olanrewaju DM and Akesode FA. School Performance of Children and Adolescents with Sickle-cell Anaemia (Sicklers). *Nigerian Journal of Paediatrics 1995; 22:* 18. Absence from school and the academic performance scores obtained at sessional examination in the 1991 academic year by 52 children and adolescents with sickle-cell anaemia (sicklers), aged between six and 17 years and also by 52 age-and sex-matched non-sicklers, were studied. Achievements of the sicklers and the controls respectively, in Mathematics, English Language, Sciences and Social Studies were also studied. The mean number of days of absence from school for the sicklers was 9.3 ± 5.5 days compared with 5.2 ± 3.1 days for controls ($P<0.001$). Mean aggregate score, 62.6 ± 15.3 percent, for the sicklers was comparable with the mean aggregate score, 64.9 ± 12.7 percent, for the controls ($P>0.1$). There was no difference ($P>0.5$) between the patients and controls who scored above average, but among the sicklers, there was a higher number of those who scored below average than among the controls ($P<0.05$). There was no correlation between the number of days of school absence and the aggregate scores for the sicklers and the controls ($P>0.05$). It is concluded that sicklers have a higher school absence and some measure of academic underachievement than normal controls.

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Introduction

SCHOOLING is a major development task for any child above five years of age; the goals of schooling include regular attendance, academic achievement and social competence. [1] Absence from school poses educational and social handicaps for all children. [2] Both prolonged and multiple brief absences can interfere with a child's aca-

demic performance and peer relationships in the school setting. [2] It had long been shown that sickle-cell anaemia (SCA) may interfere with the school attendance and academic performance of children afflicted with the disease. [3 4] In the USA, studies undertaken so as to assess school performance of children with SCA, [1 3 5] have been carried out, but to the best of our knowledge, no such studies have been carried out on this important area of function in Nigeria, where there is the largest number of patients with SCA in the world. [6]

The purpose of the present study was to examine the school attendance and academic performance of children with homozygous sickle-cell disease (HbSS) as well as those of haematologically, age - and sex-matched normal controls.

Subjects and Methods

The subjects consisted of children with SCA (sicklers) who attended the sickle-cell clinic of the Ogun State University Teaching Hospital (OSUTH), Sagamu. They were resident in and around Sagamu at the time of the study. Diagnosis of SCA was based on cellulose acetate electrophoresis of the haemoglobin. None of the children had any history of central nervous system involvement; they were also free from symptoms suggestive of other chronic illnesses. Information about age, sex, medical history, family data, school attended and class in 1991, was recorded after informed parental consent had been obtained.

The controls were selected from the same schools (16 primary and six secondary) attended by the patients. The next child to each sickler in the 1991 class register who was of the same age, sex and social background was selected. These controls had no features such as hand-and-foot syndrome, recurrent bone pains, episodes of blood transfusion or jaundice that are suggestive of SCA. Of those initially selected, four were rejected because of a history of blood transfusion in two, bronchial asthma in one and recurrent seizures in one. These four children were replaced by the next pupils who satisfied the selection criteria. Haemoglobin electrophoresis of these controls was not performed due, essentially, to ethical consideration; besides, it was considered most unlikely, in our environment, for a child with SCA to have reached school age without suggestive symptoms of the disease. The homes of the selected controls were visited and informed parental consent obtained.

School records of the patients and controls for the year 1991 were examined and the following data extracted: total number of days of school absence during the whole session, aggregate score in percentage in the sessional examination and the percentage scores obtained in Mathematics, English Language, Science and Social Studies. Student's 't' test for paired samples, Chi-squared test and Pearson's correlation coefficient 'r' were used for statistical analysis.

Results

There were 52 sicklers and 52 controls (29 males and 23 females for both sicklers and controls). The age range was six to 17 years with a mean of 9.9 years for the males and 2.1 for the females. Eighty subjects (40 sicklers and 40 controls) attended primary schools, while a total of 24, were

in secondary schools. In 1991 academic session, when the present study was undertaken, primary and secondary schools opened for a total number of 212 days. The number of days of school absence by the sicklers ranged from zero to 32 days, while the range for the controls was zero to 14 days. The mean number of days of absence for the sicklers was 9.3 ± 5.5 days and for the controls 5.2 ± 3.1 days ($t = 3.499$, $P<0.001$). The mean number of days of absentism by male sicklers was 9.9 ± 6.3 days and by the controls 5.7 ± 1.6 days ($t = 2.274$, $P<0.05$). The mean number of days of absence by the female sicklers and controls was 8.6 ± 6.6 and 4.3 ± 3.3 days respectively, ($t = 2.975$, $P<0.01$). The mean percent of aggregate scores in the sessional examination for the sicklers and the controls was 62.6 ± 15.3 and 64.9 ± 12.7 respectively, ($t = 1.091$, $P>0.1$).

The distribution of aggregate scores obtained by the sicklers and the controls is presented in Table I. There was no difference ($X^2 = 0.056$, $P>0.5$) between the patients and the controls in the score of 75 percent and above (above average). There was, however, a significant difference ($X^2 = 4.063$, $P<0.05$) and ($X^2 = 5.696$, $P<0.02$) in the score of 50 - 74 percent (average score) and in the score of below 50 percent (below average) respectively, between the sicklers and the controls. Table II summarizes the performance in core subjects by the patients and the controls. In Mathematics, 61.5 percent of the patients passed, while 38.5 percent failed compared with 78.8 percent passes and 21.2 percent failures among the controls ($X^2 = 3.722$, $P>0.5$). In Science, Social studies and English language, there was no difference ($X^2 = 0.269$, $P>0.05$; $X^2 = 1.492$, $P>0.1$; $X^2 = 0.205$, $P>0.5$, respectively) between the sicklers and the controls. In the mean percentage scores in core subjects (Mathematics, Science, Social studies and English language) obtained by the patients and the controls (Table III), there was also no difference in the scores ($P>0.5$, >0.1, >0.1, and >0.1, respectively). Pearson's correlation coefficient 'r' between the number of days of school absence and aggregate scores was - 0.0996 and - 0.929 for the patients and the controls respectively, ($P>0.05$).

TABLE I

Distribution of Aggregate Scores obtained by the Patients and Controls

Score (Percent)	*No of*		X^2	*P value*
	Patients	*Controls*		
75 (Above average)	12(23.0)	11(21.2)	0.056	>0.5
50-74 (Average)	27(52)	37(71.1)	4.03	<0.05
50 (Below average)	13(25.0)	4(7.7)	5.696	<0.02

Figures in parentheses represent percent of total
X^2 = Chi-square

TABLE II

Performances in Core Subjects by Patients and Controls

Subject	Performance by Patients P	Patients F	Controls P	Controls F	X^2	P value
Mathematics	32(61.5)	20(38.5)	41.(78.8)	11(21.2)	3.722	>0.05
Science	42(80.8)	10(19.2)	44(84.6)	8(15.4)	0.269	>0.5
Social Studies	39(75.0)	13(25.0)	44(84.6)	8(15.4)	1.492	>0.1
English Language	38(73.1)	14(26.9)	40(76.9)	12(23.1)	0.205	>0.5

P = Pass, F = Fail, X^2 = Chi - square
Figures in parentheses represent percent of total

TABLE III

Mean Percent Scores in Core Subjects by Patients and Controls

Subject	Mean ± SD Score Patients Mean	± SD	Controls Mean	± SD	t	P value
Mathematics	61.0	17.6	61.9	14.4	0.24	>0.5
Science	67.4	19.8	70.0	13.7	0.74	>0.1
Social Studies	66.8	17.3	69.1	11.2	0.697	>0.1
English Language	68	18.5	63.7	16.6	0.965	>0.1

SD = Standard deviation

Discussion

The present study has shown that children with sickle-cell anaemia are more frequently absent from school than age-and sex-matched controls. This finding is similar to that from the USA; [1 5] it also confirms that a chronic illness in childhood, such as leukaemia, asthma, haemophilia, congenital cardiac diseases, cystic fibrosis, epilepsy and chronic lung diseases, [1 7 8] is associated with a high rate of school absence. Children with any chronic health disorder often suffer from acute exacerbations of the respective condition which impairs the ability to cope with normal activities, such as school attendance. In particular, sickle-cell crises quite often lead to hospitalization of affected children, thereby encroaching upon school time. In

the present study, the academic achievement of the patients and the controls compared favourably as there was no significant differences between the mean aggregate scores for the patients and their controls. Although both groups had a virtually similar proportion of 'above average' pupils, there was a greater number of poor achievers (below average pupils) amongst the sicklers.

The relative underachievement on the part of 25 percent of sicklers in the present study, was unlikely to be due to higher school absence, because there was no correlation between school absence rate and academic performance. A more tenable explanation may therefore, be that sickle-cell anaemia has a more direct impact on the intellectual abilities of some of the affected children. One possible explanatory mechanism is that hypoxic insults to the brain may occur from time to time in sickle-cell anaemia during episodes of subclinical intracerebral sickling and thrombosis leading to cerebral atrophy.[5 9] One of the subtle outcomes of this phenomenon could well be impaired intellectual performance and school underachievement. This theory of 'subclinical stroke' and its after-effects deserve further investigation, using neurodiagnostic techniques, such as CT scan of the brain and magnetic resonance imaging.[9] Nevertheless, the observation that sickle-cell anaemia does affect the intellectual performance of children, albeit in a subtle manner, is a very serious one and calls for close monitoring of the school progress of individual sicklers.

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