Journal Homepage: -www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI:10.21474/IJAR01/2670
DOI URL: http://dx.doi.org/10.21474/IJAR01/2670

ISSN NO. 2320-5407

RESEARCH ARTICLE

The Effect of Sickle Cell Anemia On Children's Academic Performance

Tareq Mohammed Hakami[1], Abdulaziz Nasser Alhaily[1], Ahmed marwan alshaalan[1], Mohammed algozi[1], Ahmed Ibrahim Alqurashi[1], Ahmed Mohammed kurdi[1], Ahmed Maroof Ba dheeb[1], Amaar MohammedSaleh alsyamy[1], Ahmad Adnan Hariri[1], Omar saeed bafarag[1], Hatim abdulkarim khatib[2], Samir hasan halabi[2], Abdulrahman Adel Katabi[3], Ghaleb Sabri Atassi[4], Abdulwahed M. Sabri Atassi[4], Saeed farooq umer farooq hafiz mohammad din baksh[5], Saeeda farooq umer farooq hafiz mohammad din baksh[5] and Zeinab abdelwahabyousif yagoub 6.

1. Ibn Sina National College , Jeddah.
2. College Of Medicine King Abdulaziz University , Jeddah.
3. Misr University for Science and Technology.
4. University of Science and Technology , Yemen.
5. Karachi University.
6. University of medical science and technology.

Manuscript Info

Manuscript History

Received: 31 October 2016
Final Accepted: 30 November 2016
Published: December 2016

Key words:-
sickle cell anemia, children, academic performance

Abstract

Background: Sickle cell Anemia is a global health problem and truly a challenge as identified by WHO in terms of worldwide morbidity and mortality and in terms of chronic disease affecting not only the health but also the quality of life ofindividuals.

Aim: To assess the level of academic performance in children with sickle cell anemia and determine the factors that affect it, in the area ofKhartoum.

Methods: An observational, case-finding, hospital-based study, which was carried out in two different hospitals (Academe Charity Teaching Hospital and Jaafar ibn Oaf Pediatric Hospital) between the period of September 2014 and February 2015 to assess the effect of sickle cell anemia on children's academic performance. Data was collected through a pre-coded data collection sheet in the form of questionnaires, where data was gathered from the children's parents via individualinterviews.

Results: Ninety subjects (100%) were found and showed a wide range of ages (4 to 18yrs) with the majority between the age group of (7 to 9 yrs).45 (50%) of the children were males. Most of them were primary schoolers 59(65.6%) (and were diagnosed before the age of 6 months 46 (51.1%). Moreover, the p- value showed a strong association between academic performance and time spent in the hospital; teacher-parent-child interaction and communication; stroke; and number of children in the family with SCA, and this was evident among those that scored poorly especiallyrepeaters.

Corresponding Author:-Al-Hassan Ahmed.
Address:-College of Medicine – University of Jeddah – Saudi Arabia.

Conclusion: There was a strong contribution of some factors to academic performance including the time spent in hospital; teacher-parent-child interaction and communication; stroke; and number of children in the family with SCA. Showing the need for improvement of the health and quality of life of school children with SCA in terms of academic performance in Khartoum, sudan.

……....

Introduction:-

The World Health Organization (WHO) has declared Sickle Cell Anemia (SCA) a public health priority. There are 300,000 births/year worldwide, and over 75% in Africa. [1] Sickle cell anemia is the most common inherited blood disorder in the United States. Three million have sickle cell trait [2] and nearly all of them of African American ancestry [3]**.** The sickle-cell trait (HbAS) is now known to be widespread [4]and thecarrier frequency is highest in malaria-endemic areas **5** but this disease is now common worldwide due to migration. [4]**.** Rates of SCA and trait varied in different areas in Sudan with the highest rates reported from Western and Eastern Sudan. Sickle cell gene is also known to be prevalent in the Khartoum area, the capital of Sudan. [6] SCD results in early childhood death if left untreated, and its effect on the burden of health care is being recognized as a global issue in terms of chronic disease. [7]

A Sickle cell disease (SCD) is a group of inherited disorders characterized by defective hemoglobin (Hb) synthesis [5]. It is an autosomal recessive disorder [3]where a single mutation leads to the replacement of glutamic acid with valine in position 6 of the β-globin chain resulting in a mutant form of Hb known as sickle Hb (HbS) [5]. SCD denotes all genotypes containing at least one sickle gene, in which HbS makes up at least half the hemoglobin present,out of which, there are many types ranging from the carrier asymptomatic genotype (HbAS), also known as sickle cell trait, to the most common and severe genotype, the homozygous (HbSS) also known as Sickle Cell Anemia. When red blood cells (RBCs) containing homozygous HbS are exposed to deoxy conditions, the sickling process begins and prompts a crisis through vascular obstruction and ischemia resulting in a wide range of clinical problems, of which the most important cardinal signs include hemolytic anemia; painful vaso-occlusive crisis; and multiple organ damage from micro-infarcts, including heart, lung, skeleton, spleen, and central nervous system (stroke)**.** [3]

This not only affects individuals on the short run, but also affects them on the long run as it may affect their quality of life especially the academic and professional life of individuals. While, academics is crucial in the development of every humans including children, some factors may have potential influence on the academic performance of children with SCA [8], as seen from former documented studies. These factors may include disease-related factors (chronic anemia, School absenteeism, Age); neurological factors (neurocognitive, intellectual, behavioral); and environmental/psychosocial factors (socioeconomic status, parent educational level and coping ability). For example,Stroke in youth with SCA represents one of the most serious complications due to its potential deleterious impact on neurocognitive functioning.[9]Here comes the importance of taking initiatives to improve the outcomes and quality of life of children with sickle cell Anemia. The first of these initiatives being: more research in this field of importance; the development of strategic management plans; and the development of specially designed programs for this sector of the society.

An expert panel has released evidence-based guidelines for the treatment of SCD, including a strong recommendation that hydroxyurea and long-term, periodic blood transfusions should be used more often to treat patients. Many other recommendations have also been established.[3, 10]Moreover, School personnel and caregivers play an important role in a student's health and academic success. For students living with a chronic health condition like SCD, communication between parents and school officials is essential in supporting positive academic outcomes.[11] Many online educational materials and tips have been put to describe sickle cell disease (SCD) and identify roles for teachers, other school staff and parents/caregivers to support students living with SCD.[11]

As when it comes to programs that help children with SCD, we find abundant international programs but programs such as these in Sudan are deficient. Some of the important international programs for SCA patients and patients with other hemoglobin disorders include WHO, SCDAA, RuSH and CDC Programs. [4,2,12,13]. Sickle cell Anemia is

therefore a global health problem and truly a challenge especially when it comes to academics. E that needs recognition and vigorous intervention.

Sickle Cell Anemia & Academic Performance:-

Sickle Cell Anemia (SCA) is the commonest inherited disorder of hemoglobin. While, academics is crucial in the development of every human including children, some factors may have potential influence on the academic performance of children with SCA.[8] These factors may include disease-related (chronic anemia, School absenteeism, Age); neurological (neurocognitive, intellectual, behavioral); and environmental/psychosocial (socioeconomic status, parent educational level and coping ability) factors.

Disease-related Factors:-

Chronic Anemia: This directly influences neurocognitive functioning through decreased oxygen supply to the brain, which underlies the pathophysiologic mechanism of silent cerebral infarction. Note that, other identified risk factors for silent infarcts include a history of frequent painful events and leukocytosis. Chronic anemia may also indirectly affect children with SCD through associated fatigue, which can result in difficulty paying attention in school. [9, 8]

School Absenteeism: Frequent school absence has been noted in children with SCA. It also has been reported as an important predictor of academic attainment as children who are frequently or consistently absent from school tend to perform poorly. This is because multiple, brief or prolonged absences can interfere with the processes of knowledge acquisition as well as other activities. [8]

Age: Certain age groups are more at risk considering SCA morbidity and academic performance. Hawasawi and co-workers demonstrated this in Saudi Arabia when they found the commonest age group affected to be 5-10 year olds while the prevalent cause of admission was Vaso-Occlusive Crisis (VOC). This age group period has also been identified as the critical period for susceptibility to brain infarctions which are increasingly recognized as a major cause of school problems, lower IQ and other neurocognitive deficits. [8]

Neurological Factors:-

Neurocognitive factors: Children with the most common form of sickle cell disease, sickle cell anemia or HbSS, experience more frequent and severe symptoms than children with other forms of the disease such as HbSC. Stroke in youth with SCD represents one of the most serious complications due to its potential deleterious impact on neurocognitive functioning. However, even children with SCD without evidence of stroke (i.e., on neuroimaging) demonstrate neurocognitive impairment relative to their healthy peers.[9]

Intellectual factors: Previous research has suggested that children with sickle cell disease may exhibit cognitive deficits even in the absence of direct cerebrovascular involvement (stroke).[17] For example, children with SCD demonstrate specific deficits in attention, concentration, reading decoding, and executive skills. Furthermore, children with SCD score lower than their healthy counterparts on measures of intelligence (measured as the intelligence quotient or IQ), specifically in the areas of crystallized ability, processing speed, and short-term memory.[9, 8]

Behavioral factors: Children with SCD with neurological dysfunction also demonstrate increased behavioral problems in school related to impaired executive function and are therefore more likely to be retained or receive special education services. They demonstrate an increased risk for behavioral problems and internalizing disorders which make them at risk for reduced health-related quality of life (HRQoL), although many children with SCD nonetheless demonstrate adaptive coping skills, including interpreting minor health events without increased anxiety. Better adjustment to SCD may be due to various psychosocial factors including lower perceived stress, more adaptive family functioning, and reduced negative coping, such as catastrophizing, and passive coping, such as passive adherence to typical medical recommendations regardless of the nature of the pain crisis.[9]

Environmental and Psychosocial factors:

Socioeconomic status: Research has documented the negative effects of environmental factors such as low socioeconomic status (SES) or family income on neurocognitive functioning above and beyond the contribution of disease factors in children with SCD, many of whom come from lower SES backgrounds. In contrast, for those children who come from families with higher SES, environmental factors may protect against the direct and indirect effects of the disease on academic achievement.[9]This is attributed to poor motivation, unsatisfactory home

environment and neglect amongst children with poor socioeconomic background. Other factors contributory to poor school performance include poor housing and nutritional inadequacies. [8]

Parental education: This is positively correlated with academic achievement in children with SCD and may be the most critical aspect of SES, as economically disadvantaged children or children with less educated parents may have fewer opportunities for learning and stimulation .[9] All The following studies show evidence of the presence of these factors that affect academic performance:

Problem Statement

SCA is a global health problem in terms of morbidity, mortality and in terms of being a chronic health issue, as identified by WHO. It contributes a large proportion of Africans, affecting many children in Sudan, especially Khartoum area. Not only does it affect their health but also affects their quality of life especially their academics. While, academics is crucial in the development of every human including children, some factors may have potential influence on the academic performance of children with SCA. These are at risk for neurocognitive impairment and poor academic achievement, although there is limited research on factors predicting academic achievement in this population. This study explores the relative contribution to academic achievement of a comprehensive set of factors, such as environmental/psychosocial factors (parental coping ability; teacher interaction and communication with sicklers and their parents; and number of other affected siblings) and disease-related factors (history of stroke; number of blood transfusions; time spent in hospital; school absence; and age at diagnosis). All in all, this research serves to assess and aim for adequate care of those special group of children whom suffer from the disease. However, in case of inadequate care, this research further helps wake the community to such matter and becomes a very important initiative for the improvement of the health and quality of life of school children with SCA in terms of academic performance.

Aim and Objectives:-

Aims:

- To assess the level of academic performance in children with sickle cell anemia.
- To determine the most prominent Factors that affect the level of academic performance in children with sickle cell Anemia.

Objectives:-

- To assess the level of academic performance in children with sickle cell Anemia in terms of end-of-school year grades.
- To determine whether there is association between the level of academic performance and environmental/psychosocial factors (such as parental coping ability; teacher interaction and communication with sicklers and their parents; and number of other affected siblings).
- To determine whether there is association between the level of academic performance and disease-related factors (such as history of stroke; number of blood transfusions; time spent in hospital; school absence; and age at diagnosis).

Methods:-

Study approach and design:

This study is a qualitative approach study, an observational, case-finding, hospital-based study that was designed to determine the Effect of sickle cell anemia on children's academic performance at Academe Charity Teaching Hospital (ACTH) and Jaafar ibn Ouf Pediatric Hospital.

Study Area and Period:

This study was carried out at the Academe Charity Teaching Hospital and Jaafar Ibn Oaf Pediatric Hospital during the period of September 2014 to February 2015.

Study Population:

The study population comprised children with Sickle Cell Anemia who were found during the study data collection period.

Eligibility Criteria:
Inclusion Criteria: SchoolChildren with sickle cell Anemia (Homozygous Hb SS), who attended the clinics and in-hospital stay units, who were willing to participate in the study. Exclusion Criteria:Children with other hemoglobin gene variants (other than HbSS), were excluded from the study. Children that were not enrolled in schools due to reasons unrelated to the disease (traditional, financial, religious, cultural beliefs etc.)**.**

Data Collection Tools and Analysis:
Data was collected through a pre-coded data collection sheet in the form of specifically pretested designed questionnaires, where data was gathered from the children's parents via individual interviews. Data gathered, was analyzed using the SPSS (Statistical Package of Social Science) computer software program.

Ethical Considerations:
Approval to conduct the study, having satisfied the ethical requirements of the research, was obtained by the ethical committee at the 'University of Medical Sciences and Technology' and the hospitals under study. Permission and verbal consent where obtained from the patients and their parents. All subjects' confidentiality was guaranteed, as no names were used.

Results:-

A case finding observational study that assessed children with SCA who attended two different hospitals (Academe Charity Teaching Hospital and Jaafar ibn Oaf Pediatric Hospital) during the period of September 2014 to February 2015 were studied to assess the effect of SCA on academic performance.90 subjects were found and had the following results: Table 1 shows the age of children having sickle cell anemia was found to be a at maximum of 18 years old and a minimum of 4 years old.

Table 1:-Descriptive statistics for Age

	N	Minimum	Maximum	Mean	Std. Deviation
Age (yrs.)	90	4	18	10.13	3.778
Age of child	90	1	108	13.76	19.397

From 90 subjects, a large proportion of them, (24) (26.7%) children were between the ages of 7 to 9 years and only a few (7) (7.8%) were children between the ages of 16 to 18 years old as shown in **Figure 1**.

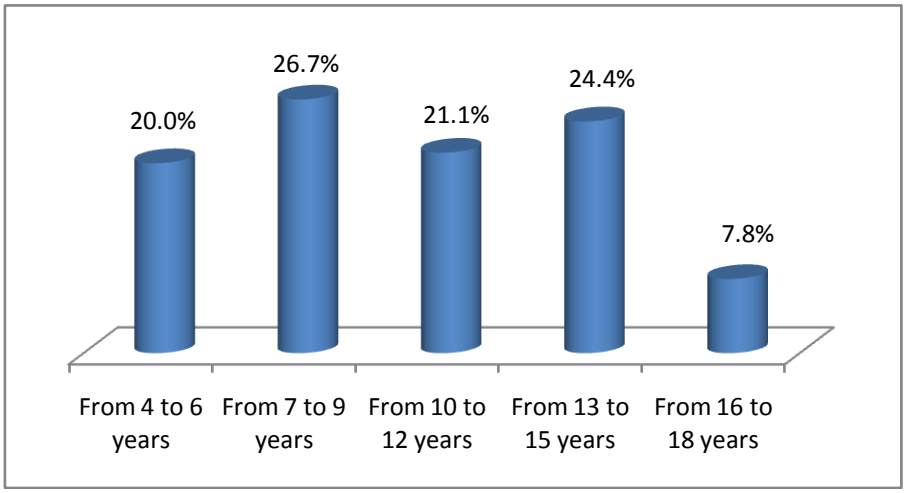

Figure 1:-Distribution of age into groups

Out of the 90 (100%) subjects, males and female were evenly distributed. (45 each) (50.0%) as shown in **Figure 2.**

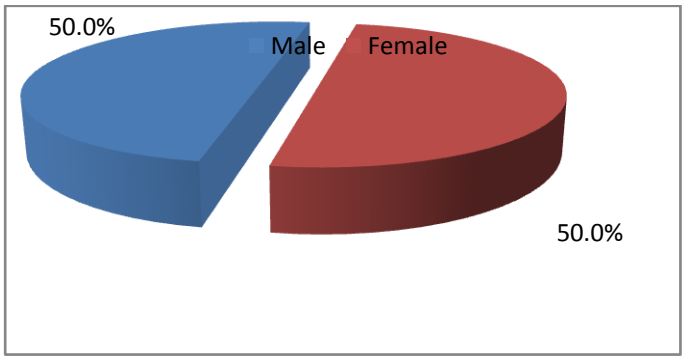

Figure 2:-Distribution of Gender

Most of the children attended primary school (59) (65. 6%).The rest, in (29) (32.2%) attended pre-school and only (2) (2.2%) attended secondary school as shown in **Figure 3**.

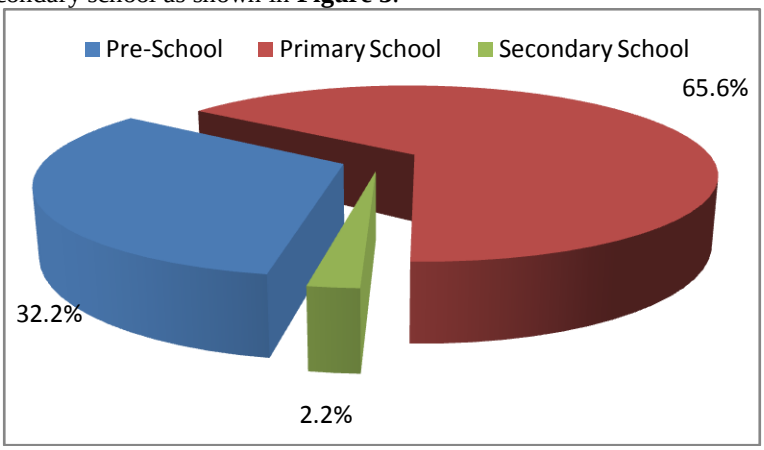

Figure 3:-Distribution of Educational level

The majority of children were diagnosed with sickle cell anemia before the age of 6 months (46) (51.1%). Then from 7 months to 1 year (28) (31.1%) children; from 1to 3 years (10) (11.1%) children and for those diagnosed after 3 years of age only 6(6.7%) were seen, as shown Figure 4.

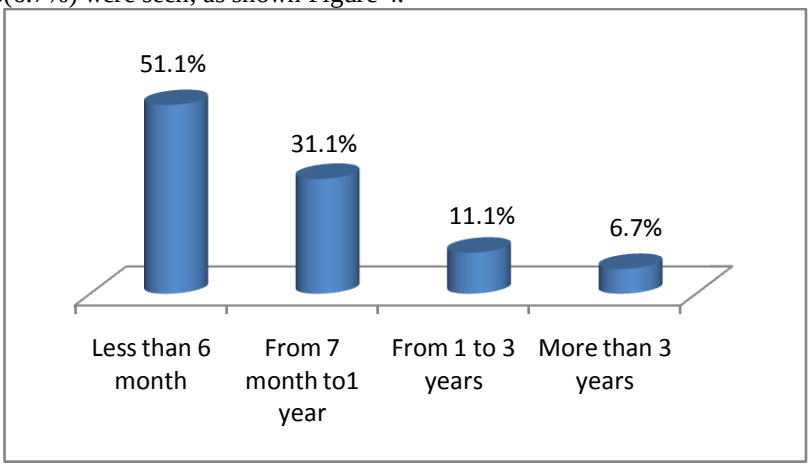

Figure 4:-Children age when diagnosed with sickle cell anemia

During admission of these children, time spent in hospital for more than a third of them 36(40.0%) was less than 1 week. As for the rest, 31(34.4%) children spent more than 2 weeks, and 23(25.6%) children spent 1to 2 weeks, as seen in Table 2. Frequent school absence was seen among more than half of the children 58 (64. 4%).Occasional absence was among third of them 30(33.3%), and No absence was seen in only 2 (2.2%) children, as in Table 2.

Table 2:-Time spent in hospital and School Absence

	Frequency	Percent
Time spent in hospital		
Less than 1 week	36	40.0%
Between 1 to 2 weeks	23	25.6%
More than 2 weeks	31	34.4%
School Absence		
Frequent	58	64.4%
Occasional	30	33.3%
No	2	2.2%
Total	90	100%

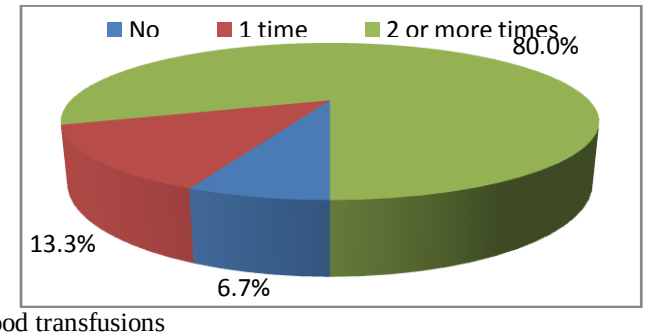

Figure 5:-Frequency of blood transfusions

From total of 90 (100%) children, half of them 49(54.4%) showed strong teacher-parent and child interaction and communication as shown in Table 3.

Table 3:-Teacher communication and interaction with Sicklers and their parents

	Frequency	Percent
Poor	41	45.6%
Strong	49	54.4%
Total	90	100%

From the Total of 90 (100%) children, only 3 (3.3%) children had a stroke, as shown in Table 4.

Table 4:-Presence of stroke

	Frequency	Percent
Yes	3	3.3%
No	87	96.7%
Total	90	100%

From the total 90 (100%), more than a third 38(42.2%) had only 1 child in the family with SCA. As for the rest,32(35.6%) had 2 children, and 20 (22.2%) had 3 or more affected children, as shown in Figure 6.

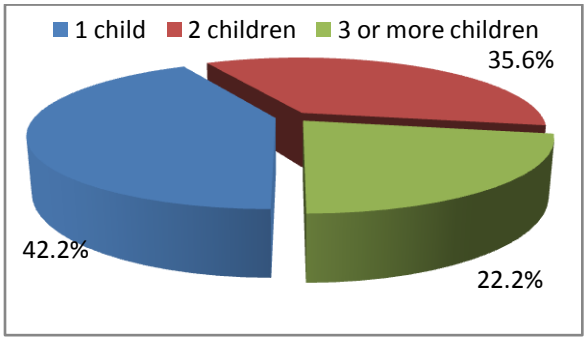

Figure 6:-Family history with SCA

From the total of 90 subjects, more than half of them had difficult Parental coping ability 61 (67.8%) and only 29 (32.2%) had easy coping, as seen in Table 5.

Table 5:-Parental Coping Ability

	Frequency	Percent
Easy	29	32.2%
Difficult	61	67.8%
Total	90	100%

From the total number of children 90, concerning the end-of-school year grades, nearly half of them were repeaters 37(41.1%). As for the rest, good 16(17.8%), Excellent 15 (16.7%), very good 12(13.3%), and with the least amount of children 10(11.1%) showing satisfactory grades, as seen in table 6.

Table 6:-End-of-school year grades

	Frequency	Percent
Excellent	15	16.7%
Very good	12	13.3%
Good	16	17.8%
Satisfactory	10	11.1%
Repeat	37	41.1%
Total	90	100%

Those with poor grades spent more time at hospital: among those who spent more than 2 weeks in hospital 31(100%), majority of them where repeaters 17 (54.8%). Only 3(9.7%) scored excellent as similarly those with other grades in between. The p-value showed a strong association between grades and time spent in hospital as shown in Table 7.

Table 7:-End-of-school year grades in relation to Time spent in hospital

End-of-school year grades	Time spent in hospital (w)			Total	P -Value
	Less than 1 week	Between 1 to 2 weeks	More than 2 weeks		
Excellent	8	4	3	15	
	53.3%	26.7%	20.0%	100.0%	
	22.2%	17.4%	9.7%	16.7%	
Very good	5	4	3	12	
	41.7%	33.3%	25.0%	100.0%	
	13.9%	17.4%	9.7%	13.3%	
Good	7	4	5	16	**0.799**
	43.8%	25.0%	31.3%	100.0%	
	19.4%	17.4%	16.1%	17.8%	
Satisfactory	4	3	3	10	
	40.0%	30.0%	30.0%	100.0%	
	11.1%	13.0%	9.7%	11.1%	
Repeat	12	8	17	37	
	32.4%	21.6%	45.9%	100.0%	
	33.3%	34.8%	54.8%	41.1%	
Total	36	23	31	90	
	40.0%	25.6%	34.4%	100.0%	
	100.0%	100.0%	100.0%	100.0%	

Among those who have frequent school absence 58(64.4%), majority of them where repeaters 29 (50.0%). Only 6(10.3%) of excellent scorers had frequent school absence. The p-value showed no association between grades and school absence as shown in Table 8.

Table 8:-End-of-school year grades in relation to School Absence

End-of-school year grades	School Absence			Total	P -Value
	Frequent	Occasional	No		
Excellent	6	8	1	15	
	40.0%	53.3%	6.7%	100.0%	
	10.3%	26.7%	50.0%	16.7%	
Very good	4	8	0	12	
	33.3%	66.7%	.0%	100.0%	
	6.9%	26.7%	.0%	13.3%	
Good	10	6	0	16	
	62.5%	37.5%	.0%	100.0%	**0.026**
	17.2%	20.0%	.0%	17.8%	
Satisfactory	9	1	0	10	
	90.0%	10.0%	.0%	100.0%	
	15.5%	3.3%	.0%	11.1%	
Repeat	29	7	1	37	
	78.4%	18.9%	2.7%	100.0%	
	50.0%	23.3%	50.0%	41.1%	
Total	58	30	2	90	
	64.4%	33.3%	2.2%	100.0%	
	100.0%	100.0%	100.0%	100.0%	

Among those who Blood transfused 2 or more times in hospital 72(100%), the majority of them where repeaters 31 (43.1%). Only 9 (12.5%) were among excellent scorers as similarly those with other grades in between. However, among those that Had not received blood 6(100%), the majority were among those who scored very good 4(66%). The p-value showed no association between grades and blood transfusions as shown in Table 9.

Table 9:-End-of-school year grades in relation to Blood Transfusions

End-of-school year grades	Blood Transfusions			Total	P -Value
	No	1 time	2 or more times		
Excellent	1	5	9	15	
	6.7%	33.3%	60.0%	100.0%	
	16.7%	41.7%	12.5%	16.7%	
Very good	4	1	7	12	
	33.3%	8.3%	58.3%	100.0%	
	66.7%	8.3%	9.7%	13.3%	**0.002**
Good	0	0	16	16	
	.0%	.0%	100.0%	100.0%	
	.0%	.0%	22.2%	17.8%	
Satisfactory	0	1	9	10	
	.0%	10.0%	90.0%	100.0%	
	.0%	8.3%	12.5%	11.1%	
Repeat	1	5	31	37	
	2.7%	13.5%	83.8%	100.0%	
	16.7%	41.7%	43.1%	41.1%	
Total	6	12	72	90	
	6.7%	13.3%	80.0%	100.0%	
	100.0%	100.0%	100.0%	100.0%	

Among all subjects, there was a nearly equal poor and strong teacher interaction. However, the majority of those who scored very good had a strong interaction with their teachers 9(75%). The p-value showed a strong association between grades and teacher interaction as shown in Table 10.

Table 10:-End-of-school year grades in relation to Teacher interaction

End-of-school year grades	Teacher interaction		Total	P -Value
	Poor	Strong		
Excellent	7	8	15	
	46.7%	53.3%	100.0%	
	17.1%	16.3%	16.7%	
Very good	3	9	12	
	25.0%	75.0%	100.0%	
	7.3%	18.4%	13.3%	
Good	7	9	16	**0. 548**
	43.8%	56.3%	100.0%	
	17.1%	18.4%	17.8%	
Satisfactory	6	4	10	
	60.0%	40.0%	100.0%	
	14.6%	8.2%	11.1%	
Repeat	18	19	37	
	48.6%	51.4%	100.0%	
	43.9%	38.8%	41.1%	
Total	41	49	90	
	45.6%	54.4%	100.0%	
	100.0%	100.0%	100.0%	

Among those who Got stroke 3 (100%), two of them where repeaters 2 (66.8%). Only 1(33.3%) scored satisfactory. The p-value showed an association between grades and the presence of stroke as shown in Table 11.

Table 11:-End-of-school year grades in relation to Presence of stroke

End-of-school year grades	Presence of stroke		Total	P -Value
	Yes	No		
Excellent	0	15	15	
	.0%	100.0%	100.0%	
	.0%	17.2%	16.7%	
Very good	0	12	12	
	.0%	100.0%	100.0%	
	.0%	13.8%	13.3%	
Good	0	16	16	
	.0%	100.0%	100.0%	**0.500**
	.0%	18.4%	17.8%	
Satisfactory	1	9	10	
	10.0%	90.0%	100.0%	
	33.3%	10.3%	11.1%	
Repeat	2	35	37	
	5.4%	94.6%	100.0%	
	66.7%	40.2%	41.1%	
Total	3	87	90	
	3.3%	96.7%	100.0%	
	100.0%	100.0%	100.0%	

Among those who have 3 or more children with sickle cell anemia in the family 20(100%), half of them where repeaters 10 (50.0%). However, among those that just 1 child with SCA in the family, 38(100%), the majority were also among repeaters 7 (58. 3%).The p-value showed a strong association between grades and number of children with SCA in the family as shown in Table 12.

Table 12:-End-of-school year grades * Number of children in family with SCA

End-of-school year grades	Number of children in family with SCA			Total	P -Value
	1 child	2 children	3 or more children		
Excellent	7	6	2	15	
	46.7%	40.0%	13.3%	100.0%	
	18.4%	18.8%	10.0%	16.7%	
Very good	7	3	2	12	
	58.3%	25.0%	16.7%	100.0%	
	18.4%	9.4%	10.0%	13.3%	
Good	6	6	4	16	**0.948**
	37.5%	37.5%	25.0%	100.0%	
	15.8%	18.8%	20.0%	17.8%	
Satisfactory	4	4	2	10	
	40.0%	40.0%	20.0%	100.0%	
	10.5%	12.5%	10.0%	11.1%	
Repeat	14	13	10	37	
	37.8%	35.1%	27.0%	100.0%	
	36.8%	40.6%	50.0%	41.1%	
Total	38	32	20	90	
	42.2%	35.6%	22.2%	100.0%	
	100.0%	100.0%	100.0%	100.0%	

Among those who had easy parental coping ability 29 (100%), majority of them where had excellent grades 10 (34.5 %). However, among those who had difficult parental coping ability 61(100%), the majority were among repeaters30(49. 2%). The p-value showed no association between grades and parental coping ability as shown in Table 13.

Table 13. End-of-school year grades * Parental coping ability

End-of-school year grades	Parental coping ability		Total	P -Value
	Easy	Difficult		
Excellent	10	5	15	
	66.7%	33.3%	100.0%	
	34.5%	8.2%	16.7%	
Very good	5	7	12	
	41.7%	58.3%	100.0%	
	17.2%	11.5%	13.3%	
Good	3	13	16	
	18.8%	81.3%	100.0%	**0.010**
	10.3%	21.3%	17.8%	
Satisfactory	4	6	10	
	40.0%	60.0%	100.0%	
	13.8%	9.8%	11.1%	
Repeat	7	30	37	
	18.9%	81.1%	100.0%	
	24.1%	49.2%	41.1%	
Total	29	61	90	
	32.2%	67.8%	100.0%	
	100.0%	100.0%	100.0%	

Disscussion:-

Children with SCD are confronted with disease, environmental, and psychosocial challenges that can impact academic achievement. Disease complications for these children include neurocognitive impairment due to chronic anemia and/or stroke, difficulty participating in class due to pain or fatigue, and health-related symptoms that can result in school absence. Complicating psychosocial and environmental factors include increased risk of reduced

quality of life, limited access to education and economic disadvantage. Despite many potential risk factors, predictors of academic achievement have not been well studied in this population. The purpose of this study was to examine the relative contribution of a range of disease, environmental, and psychosocial factors to academic achievement in children with SCD. The main findings from this study were that, have found lower scores in children with Sickle cell anemia that have Frequent school Absence Due to Frequent hospitalization more than 2 weeks had poor performance and grades at school most are repeaters Because of the Crises and disease Process of academic achievement The mean scores of youth in the current sample, however, fell within the average range compared to normative sample means on measures of academic skills, math calculation, and broad reading. As such, despite the myriad of factors that place children with SCD at risk for compromised educational outcomes.

Parent education and coping ability also was significant predictor of academic achievement in this study As High level of education of the parents about their child situation the grades and academic achievement family income was not correlated with academic achievement in this study (finance), suggesting that parent education may be a more salient factor for identifying children with SCD who may benefit from early identification, monitoring, and/or intervention to promote academic development. Parent education has been indirectly associated with academic achievement in an African-American sample through beliefs about their child's achievement and responsiveness and stimulation of the family environment [14] and to neurocognitive functioning in children with SCD. [15] However, to our knowledge, the current study is the first to identify the association between parent education and academic achievement in a pediatric SCD population. Although most of the families in this sample live below the poverty line, over half of the caregivers attended at least some college, reflecting national trends that point to lower income.it is likely that more highly educated caregivers are equipped to assist their children with strategies to succeed in school despite the risk of low SES, for example by monitoring homework assignments and communicating with the child's school. Therefore, interventions that encourage parental participation may be able to assist less educated parents in developing strategies to support their child's education as well as convey beliefs surrounding the importance of education and the benefit of academic effort in obtaining future opportunities.

Disease-related factors including average hemoglobin, genotype, nutrition, and adherence, chronic transfusion status emerged as a significant predictor of academic achievement such that children on chronic transfusion treatment scored lower than those children not receiving transfusion treatment. Chronic blood transfusions are a common treatment for children who have suffered a stroke or who are at risk for a stroke, suggesting that lower scores in the chronic transfusion group may reflect the direct, negative effects of SCD complications on neurological integrity and, in turn, cognitive functioning and academic achievement. In addition, the frequency of transfusion treatment (every 3 to 6 weeks) more Than 3 times increases school absences and could thereby contribute to poor academic achievement. Although stroke status did emerge as a significant independent predictor of academic achievement in this sample, there is strong evidence for an association between stroke status and cognitive and academic achievement for children with SCD 2 of them in this study did not go to school and 1 had delay (repeat) but generally. Due to the small group of children with a history stroke in the current study, it is possible that there was insufficient power to detect an association between stroke status and academic achievement. Also in this study significant about the number of child sibling that suffer from the disease will affect the care and attention by the parents to their children therefore it will affect directly in the school performance

Conclusion:-

A case finding observational study that assessed children with SCA who attended two different hospitals (Academe Charity Teaching Hospital and Jaafar ibn Oaf Pediatric Hospital) during the period of September 2014 to February 2015 were studied to assess the effect of SCA on academic performance. Ninety subjects were found and showed a wide range of ages (4 to 18yrs) with the the majority between the age group of (7 to 9 yrs.). Most of them were primary schoolers and were diagnosed before the age of 6months.More than third of them spent less than one week in the hospital, however, those with poor grades spent more time in the hospital. Furthermore, there was frequent absence among the children especially among the repeaters. The majority of children had more than 2 blood transfusions with third of them being among repeaters. More than half of the children and their parents strongly communicated and interacted with their school teachers regarding the child's illness, mostly among those who scored "very good" in end-of-year grades. Only three of them had a history of a stroke and were among those who scored poorly in their school. Furthermore, more than third of them had only one child with SCA in the family, however, half of the repeaters is one of three (or more) of affected children in the family. Most parents found it hard to cope with the disease, especially those who had children who were school repeaters. However, among those that coped well with the disease, a third of their children had scored excellent in school. In summary, there was a strong

association between academic performance and time spent in the hospital; teacher-parent-child interaction and communication; stroke; and number of children in the family with SCA.

Recommendations:-

Due to our findings that most of the sample scored below the normal percent on measures of academic achievement, the majority of children with SCD may require major interventions from school personnel in order to optimize learning.

1) Academic functioning is optimized when parents, school administrators and teachers, physicians, and mental health professionals work together and are educated on the cognitive outcomes of SCD.
2) modifications at home**.** by counseling the parents and **Allow** accommodations during extreme temperatures and conditions. Cold or hot weather can trigger pain crise and by that care the frequency of school absence will change and child will improve in performance
3) In school teachers that are willing to send assignments home, explain missed assignments, and in some cases provide alternative assignments can promote optimal school functioning for children with SCD.
4) Care of teachers and school-based mental health professionals can support students with chronic illnesses in their relationships with peers and manage minor pain episodes by working with the school nurse to allow children access to medications when needed.
5) Set up a meeting to discuss SCD with the child's teacher. It may be important for parents and teachers to meet at the beginning of each school year. These school staff should be invited to an introductory meeting
6) Early identification and treatment of children at risk for stroke as well as increased support for parents at home in obtaining special education services for their child may be instrumental in further supporting academic development in children with SCD Because of the risks to general cognitive development and in other hand Teachers should be aware that declines in academic achievement, inability to maintain attention, difficulties with organization, and mild delays in vocabulary development may be due to small brain injuries caused by strokes.,
7) children with SCD may require learning accommodations, such as early, small group instruction, close monitoring of progress, and/or accommodations in the classroom to promote optimal development.
8) Our findings reveal that there are disease factors in addition to stroke that influence academic achievement (e.g., chronic transfusion) .
9) Improve the psychosocial factors such as quality of life play an important role in determining those at risk. And easy parental coping ability with child and responsibilities of the situation.
10) Make a constant protocol for those children having SCD by frequent screening for neurocognitive deficits a comprehensive screening program that identifies children with SCD who demonstrate additional environmental and psychosocial risk factors may aid in detecting a broader range of children at risk for poor academic achievement.
11) counseling the parents about the screening programs for haemoglobinopathies, in order to of reducing the birth rate of affected with SCD Especially in areas with high prevalence rates of SCA such as Darfur and Kordofan regions, to allow couples to take an informative decision when they are both carriers of the gene.

References:-

1. Julie Makani , Sharon E. Cox ,Deogratius Soka et.al. Mortality in Sickle Cell Anemia in Africa: A Prospective Cohort Study in Tanzania. journal.pone, 2011.
2. SCDAA. http://www.sicklecelldisease.org/index.cfm?page=about-scd-sct
3. Medscape SCA http://emedicine.medscape.com/article/205926-overview#aw2aab6b2b4
4. Bernadette Modell, Matthew Darlison. Global epidemiology of haemoglobin disorders and derived service indicators. Vol 86(6) 06-036673.WHO Bulletin, 2008.
5. Sickle Cell Disease:Epidemiology and Pathophysiology. Retrieved February 27, 2015, from http://www.ironhealthalliance.com/disease-states/sickle-cell-disease/epidemiology-and-pathophysiology.jsp.
6. Majdi Mohammed Sabahelzain, Hanan Hamamy. The ethnic distribution of sickle cell disease in Sudan.vol 18:13. The Pan African Medical Journal, 2014.
7. Kofi A Anie1, Feyijimi E Egunjobi2, Olu O Akinyanju2. Psychosocial impact of sickle cell disorder: perspectives from a Nigerian setting. Vol 6:2. Globalization and Health, 2010.
8. Osita U Ezenwosu1, Ifeoma J Emodi1, Anthony N Ikefuna1, Barth F Chukwu1 and Chidiebere D Osuorah2. Determinants of academic performance in children with sickle cell anaemia. Biomedcentral, 2013.

9. Kelsey E. Smith, M.Ed, Chavis A. Patterson et al. Predictors of Academic Achievement for School Age Children with Sickle Cell Disease. NIH, PMC, 2013.
10. Expert Panel Report. Evidence-Based Management of Sickle Cell Disease. U.S. Department of Health and Human Services, NIH: National Heart, Lung, and Blood Institute, 2014.
11. Tips for Supporting Students with Sickle Cell Disease. http://www.cdc.gov/ncbddd/sicklecell/freematerials.html
12. RuSH .http://www.cdc.gov/ncbddd/hemoglobinopathies/rush.html
13. CDC. http://www.cdc.gov/ncbddd/sicklecell/data.html
14. Davis-Kean, P.E. The influence of parent education and family income on child achievement: the indirect role of parental expectations and the home environment. Journal of family psychology, 19(2), p.294, 2005.
15. Tarazi RA1, Grant ML, Ely E, Barakat LP. Neuropsychological functioning in preschool-age children with sickle cell disease: the role of illness-related and psychosocial factors.vol 13(2):155-72. Pubmed, Child Neuropsychol. 2007.
16. Robert J. Adams, M.D., Virgil C. McKie. Prevention of a First Stroke by Transfusions in Children with Sickle Cell Anemia and Abnormal Results on Transcranial Doppler Ultrasonography. vol 339:5. N Engl J Med 1998.