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Depression in Adolescent Sickle Cell Patients: A 2021 Sudan Study

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ABSTRACT

The global mental health crisis, particularly depression, is escalating due to genetic mutations affecting the sixth amino acid, glutamic acid. This cross-sectional study aimed to investigate depression among adolescents with SCA using the Beck Depression Inventory (BDI) between February 2021 and August 2021. This hospital-based cross-sectional study was conducted in Khartoum, Sudan. The study involved 102 SCA patients aged 10-19, with a majority (63.7%) aged 13-16. Depression severity was diagnosed using the Beck Depression Inventory (BDI), and statistical analysis involved chi-square tests to compare proportions between groups, with a significance level of $p<0.05$ and 95% confidence level. The study found that most males (38.5%) had none-mild depression, while most females (42.0%) had mild-moderate depression with a p-value of 0.310. Age groups showed the highest prevalence of mild-to-moderate depression (46.2%) in 10-12-year-olds and the most mild depression (33.3%) in 17-19-year-olds. Crisis frequency was infrequent among participants ($p=0.933$). A significant association was observed between crisis frequency and depression severity, with severe depression primarily seen in crisis-prone individuals (27.8%) ($p=0.001$). The study highlights the global mental illness burden and challenges faced by individuals with SCA, particularly females, emphasizing the need for early psychological support and intervention to improve their well-being.

INTRODUCTION

The worldwide prevalence of mental health issues is increasing, with depression emerging as a significant global public health concern. According to Alatab *et al.*, 2020, approximately 264 million individuals are affected by depression, and its prevalence and incidence continue to escalate (Alatab *et al.*, 2020; Ferrari *et al.*, 2013; Fu *et al.*, 2013). The disorder is considered a financial liability and affects the struggling healthcare systems (Murray *et al.*, 2012).

Additionally, vascular blockage and anaemia are characteristics of Sickle cell anaemia (SCA), an inherited disorder caused by mutations that cause the sixth amino acid to be replaced by valine instead of glutamic acid (Zorca *et al.*, 2010). Haemoglobin S and haemoglobin C are the predominant haemoglobin variants found in Africa (Chakravorty & Williams, 2015). A decade ago, approximately 80% of infants in sub-Suharan Africa had SCA, but according to Oppong *et al.* 2020 projections, this percentage is expected to rise by 10% by the year 2050 (Oppong *et al.*, 2020). The sickle-shaped red blood cells are responsible for obstructing small capillaries and pathways when exposed to low oxygen levels, as demonstrated by Makani *et al.* in 2013 and Ngwengi *et al.* in 2020 (Makani *et al.*, 2013; Ngwengi *et al.*, 2020).

Conversely, Osteomyelitis and acute chest syndrome are the complications that SCA patients encounter every day (Chakravorty & Williams, 2015). Those with a genetic tendency have a shorter life expectancy as a result of morbidities such as respiratory, renal, and cardiac failure and stroke. There are several contributing factors to this reduced life expectancy (Chakravorty & Williams, 2015; Lanzkron *et al.*, 2013). In developed countries, the life expectancy of individuals with SCA typically ranges from 40 to 60 years. However, in economically disadvantaged nations like Sudan, the life expectancy for SCA patients is significantly lower (Hamideh & Alvarez, 2013; Piel *et al.*, 2013). Additionally, around 30% of individuals with SCA experience persistent chronic pain, which is defined as enduring for more than three months (Smith *et al.*, 2008). Numerous studies have shown a strong correlation between chronic pain and mental health issues, including depression (Arnow *et al.*, 2006; Currie & Wang, 2004; Ohayon & Schatzberg, 2003). Notably, depression was more prevalent among SCA patients compared to the general population (Comer, 2004; Jenerette *et al.*, 2005). Furthermore, there is a notable association between depression in SCA patients and increased hospitalizations for vaso-occlusive pain, frequent emergency room visits, and the need for blood transfusions (Hasan *et al.*, 2003). Additionally, depression may contribute to the development of further medical complications (Leavell & Ford, 1983).

Therefore, the objective of this study was to investigate the prevalence and impact of depression among adolescents with sickle cell anemia in Sudan. The study on depression among adolescents with Sickle Cell Anemia offers unique insights into the mental health of this population. It focuses on the adolescent population, revealing varying depression severity across age groups, gender differences, and a significant association between vaso-occlusive crises and depression severity. The research recommends routine screenings, a holistic approach, and stigma reduction to improve the quality of life for SCA patients.

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MATERIALS AND METHODS

A cross-sectional survey was conducted in hospitals located within the state of Khartoum, Sudan, from February 2021 to August 2021. This survey focused on individuals diagnosed with SCA who fell within the age range of 10 to 19 and attended referral clinics along with a parent or guardian. The selection of participants was based on a modified version of the Cochran Formula, specifically adapted for small populations. In total, 102 patients diagnosed with SCA were included in the study. Data collection involved patients completing a pre-coded questionnaire through direct interviews conducted in an outpatient clinic. The questionnaire encompassed various aspects, including socio-demographic information, an assessment of depression severity, and an evaluation of the frequency of crises.

Diagnosing Depression with the Black Depression Inventory (BDI)

For the diagnosis of depression among participants, the BDI was employed. The BDI assigns scores that indicate different levels of depression severity, as follows (Beck *et al.*, 1961).

- Scores from 0 to 9: Minimal depression
- Scores from 10 to 18: Mild to moderate depression
- Scores from 19 to 29: Moderate to severe depression
- Scores from 30 to 63: Severe depression

Data Analysis

In this study, data collection, validation, and analysis were conducted using the statistical software tool (SPSS version 25). The study involved the generation of frequency distributions for both independent and dependent variables that were pertinent to the study objectives. The chi-square test compared the proportions between the two groups. Moreover, a confidence level of 95% was utilized, and a P-value of 0.05 was considered statistically significant.

RESULTS

The study included 102 participants who were diagnosed with SCA and ranged in age from 10 to 19 years. Among the participants, males were 51%, and females were 49%. The age distribution was 10 to 12 years (12.7%), 13 to 16 years (63.7%), and 17 to 19 years (23.5%). Additionally, the majority of the participants experienced mild to moderate depression (38.2%). Specifically (37.3%) demonstrated no to mild symptoms of depression. Subsequently, an additional (17.6%) of participants exhibited moderate to severe depression. In contrast, (6.9%) of participants showed symptoms of severe depression, as shown in Figure 1.

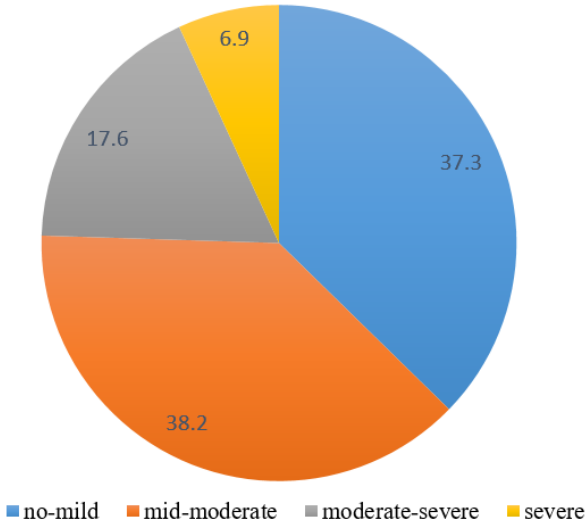

Figure 1: Severity of depression

Furthermore, an examination of the relationship between depression severity and gender revealed that there was no statistically significant association (p = 0.310). Among males, the majority experienced none to mild depression (38.5%), followed closely by those with mild to moderate depression (34.6%), while (23.1%) exhibited moderate to severe depression, and only (3.8%) had severe depression. A similar distribution was observed among females, with the highest percentage experiencing mild to moderate depression (42.0%), followed by none to mild depression (36.0%), (13.8%) experiencing moderate to severe depression, and (10%) exhibiting severe depression, as shown in Table 1.

However, analysing the connection between depression severity and age groups indicated no statistically significant association (p =0.583). Among the 10-12 years age group, mild to moderate depression was the most prevalent, affecting (46.2%0 of participants. In the 13-16 years age group, none to mild and mild to moderate depression were (40.0%) equally prevalent. Moreover, among the 17-19 years age group, mild to no depression was the most frequently observed, affecting (3.3%) of the participants. The frequency of crisis was distributed as follows: rarely (41.2%), sometimes (20.6%), often (18.6%), always (17.6%) and never (2%), as shown in Figure 2.

Table 1: Demographic distribution vs. Severity of depression

Gender	Severity of depression	None-mild	Mild-moderate	Moderate- severe	Severe	p. Value
	Male	38.5%	34.6%	23.1%	3.8%	0.310
	Female	36.0%	42.0%	12.0%	10.0%	
Age groups	10-12 yo	30.8%	46.2%	23.1%	0	0.583
	13-16 yo	40.0%	40.0%	13.8%	6.2%	
	17-19 yo	33.3%	29.2%	25.0%	12.5%	

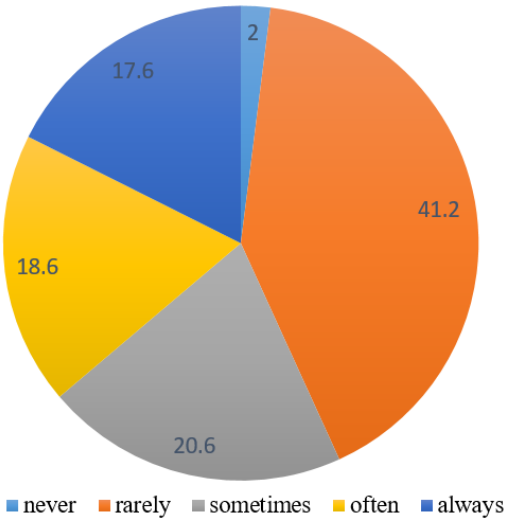

Figure 2: Frequency of crisis

In addition, the analysis of the relationship between the frequency of crises and gender revealed that there was no statistically significant association (p = 0.903). A significant proportion of males and females reported rarely experiencing crises, with percentages of (38.5%) and (44.0%), respectively. Similarly, the association between the frequency of crises and age groups showed no statistical significance (p = 0.933). The majority of participants among all age groups reported rarely experiencing crises, with percentages of (53.8%) for the 10-12 years age group, (40.0%) for the 13-16 years, and (37.5%) for the 17-19 years as shown in Table 2.

Consequently, there was a statistically significant association observed between the frequency of crises and depression severity (p = 0.001). The following breakdown describes the distribution of depression severity among participants based on the frequency of crises:

Among participants who never experienced a crisis, 50% had none to mild depression, while the other half had mild to moderate depression. Those who rarely experienced crises predominantly had none to mild depression (42.9%), followed by mild to moderate depression (47.6%), with a smaller percentage experiencing moderate to severe depression (9.5%). Among participants who sometimes experienced crises, the majority had mild to moderate depression (61.9%0, while the remaining had none to mild depression (38.1%). Approximately half of the participants who often had crises experienced mild to moderate depression (52.6%0, followed by moderate to severe depression (31.6%), and some experienced none to mild depression (15.8%). For participants who always had crises, the distribution of depression severity was as follows: none to mild depression (11.1%), mild to moderate depression (16.7%), moderate to severe depression (44.4%), and severe depression (27.8%), as shown in Figure 3.

Table 2: Demographic distribution vs. Frequency of crisis

Gender	Frequency of crisis	Never	Rarely	Sometimes	Often	Always	p. Value
	Male	1.9%	38.5%	21.2%	17.3%	21.2%	0.903
	Female	2.0%	44.0%	20.0%	20.0%	14.0%	
Age	10-12 yo	0	53.8%	15.4%	15.4%	15.4%	0.933
	13-16 yo	1.5%	40.0%	21.5%	16.9%	20.0%	
	17-19 yo	4.2%	37.5%	20.8%	25.5%	12.5%	

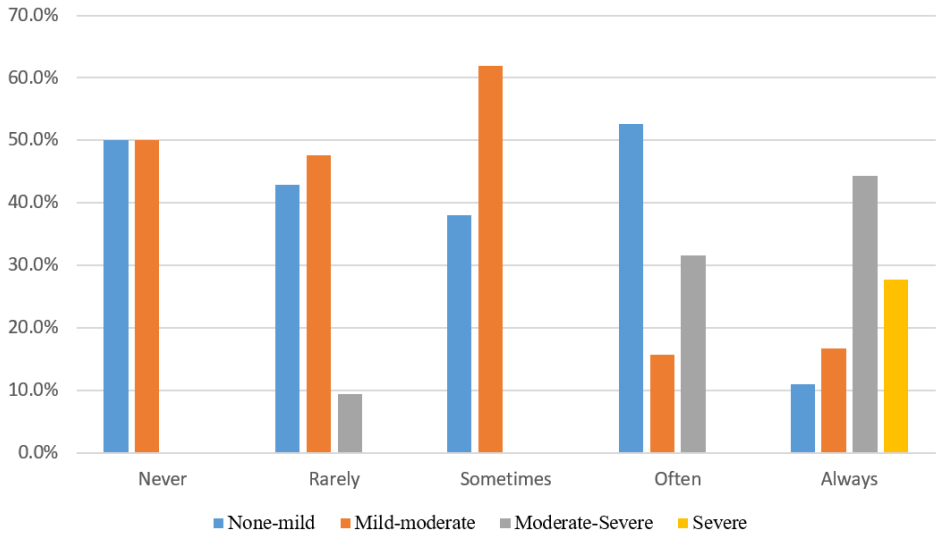

Figure 3: Frequency of crisis vs. Depression severity

DISCUSSION

Patients with SCA are challenged with substantial stress due to their disease and its management. Although many environmental stressors could cause depressive symptoms not related to SCA. However, this study aimed to investigate depression among patients between the ages

of 10 and 19 with sickle cell anaemia patients in Sudan. Most participants in the current study had mild-moderate depression (38.2%), followed closely by those who had no-mild depression (37.3%). Almost half the participants rarely had a crisis (41.2%). In this study, the severity of depression in association with gender (p=0.310) and age (p=0.583) showed a significant statistical association. While males and females were mostly on the lower scale of BDI, more females had severe depression in comparison to males. These findings are in line with a previous study where (44.4%) of the females had depression, and (20.3%) of males had depression (P = .0038) (Adam *et al.*, 2017).

In this study, by observing the incidence of severe depression, it was evaluated that depression increases as age increases, and it was not present in the age group 10-12 years. Previous studies on adolescents report more depressive symptoms than younger children because of the stressors they experience (Barakat *et al.*, 2006; Jiya *et al.*). However, other studies have stated that there is no association between age and the prevalence of depression in SCA patients (Alhomoud *et al.*, 2018; Ali *et al.*, 2017; Graves *et al.*, 2016; Sehlo & Kamfar, 2015). Furthermore, in this study frequency of crisis in association with gender (p=0.903) and age (p=0.933) showed a significant statistical association where the majority of participants had rarely experienced a crisis. Patients with SCD who also suffered from depression were shown to have a likelihood that was 2.8 times higher of being hospitalized due to a crisis than patients who did not suffer from the disease (Jonassaint *et al.*, 2016). As a result of this observation, it was examined that there exists an inverse relationship between the two variables.

Consequently, there was a statistically significant correlation between the number of crises experienced and the degree of depression (p = 0.001). The severity of depression was mild to moderate, with the exception of patients who occasionally experienced a crisis. Numerous studies have indicated that psychosocial factors play a significant role in contributing to negative medical outcomes. These outcomes encompass an elevated occurrence, longer duration, and increased intensity of painful episodes, along with adverse psychosocial consequences among individuals diagnosed with SCA (Belgrave & Molock, 1991; Gil *et al.*, 1989; Molock & Belgrave, 1994).

Individuals who experienced a greater number of traumatic experiences exhibited an elevated susceptibility to acquiring depression. Moreover, those who encountered traumatic events with higher frequency displayed an increased vulnerability to developing severe depression in comparison to individuals who experienced less traumatic events. According to (Asnani *et al.*, 2010; Hasan *et al.*, 2003; Levenson *et al.*, 2008), vaso-occlusive crises are the major cause of pain, substantial morbidity, and frequent hospitalization in SCA patients. This observation suggests a deterioration of the illness and an escalation of its associated burden. Failure to address physical discomfort and other important conditions might result in severe morbidity and perhaps fatal outcomes (Novelli & Gladwin, 2016; Simon *et al.*, 2016).

CONCLUSION

In conclusion, this study found a significant difference in depression prevalence between males and females, with females exhibiting a greater susceptibility to this mental health condition. Furthermore, the study findings indicated a tendency for the severity of depression to increase in patients diagnosed with sickle cell anemia as both their age and the number of crisis episodes increased. The study on depression among adolescents with Sickle Cell Anemia in Sudan provides valuable insights into the mental health challenges faced by this population. It highlights the importance of early detection, comprehensive assessments, and psychosocial support programs. The findings have implications for healthcare policies and public health awareness, contributing to a broader effort to destigmatize mental health issues.

LIMITATIONS AND STRENGTHS

- The sample size of 102 participants may limit the generalizability of the findings.
- However, the study focuses on adolescents with SCA, a demographic with unique mental health challenges. The Beck Depression Inventory (BDI) is used for diagnosing depression, enhancing its reliability and validity.

RECOMMENDATIONS

- Healthcare providers should include routine depression screenings in their standard care protocol for individuals with Sickle Cell Anemia (SCA) to ensure timely intervention and support.
- Comprehensive mental health assessments, including anxiety and stress, should be conducted to identify co-occurring mental health conditions.
- Future research should focus on longitudinal studies to explore additional risk factors. Quality-of-life assessments should identify areas needing targeted interventions.
- Psychosocial support programs, patient education, multidisciplinary care teams, crisis management strategies, and public health campaigns should be launched to reduce the stigma surrounding mental health issues in SCA patients.

Future Research Directions

Future research should address gaps and build upon current findings. Future research directions include longitudinal studies, qualitative research, treatment effects, health-related quality of life, cultural and societal factors, intervention studies, comparison studies, diverse samples, telehealth integration, family and caregiver perspectives, and resilience and coping strategies. These efforts can contribute to a more comprehensive understanding of depression in SCA patients and develop targeted interventions for improved mental health.

REFERENCES

Adam, S. S., Flahiff, C. M., Kamble, S., Telen, M. J., Reed, S. D., & De Castro, L. M. (2017). Depression, quality of life, and medical resource utilization in sickle cell disease. *Blood advances, 1*(23), 1983-1992.

Alatab, S., Sepanlou, S. G., Ikuta, K., Vahedi, H., Bisignano, C., Safiri, S., Sadeghi, A., Nixon, M. R., Abdoli, A., & Abolhassani, H. (2020). The global, regional, and national burden of inflammatory bowel disease in 195 countries and territories, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. *The Lancet gastroenterology & hepatology, 5*(1), 17-30.

Alhomoud, M. A., Gosadi, I. M., & Wahbi, H. A. (2018). Depression among sickle cell anemia patients in the Eastern Province of Saudi Arabia. *Saudi Journal of Medicine & Medical Sciences, 6*(1), 8.

Ali, E., AlHalwachi, F., Khalil, F., Hejab, Z. M., Almolem, Z., & Mandil, M. (2017). Health-related quality of life in adults with sickle cell disease in the Kingdom of Bahrain (FPRP). *Saudi J Med, 2*, 3-14.

Arnow, B. A., Hunkeler, E. M., Blasey, C. M., Lee, J., Constantino, M. J., Fireman, B., Kraemer, H. C., Dea, R., Robinson, R., & Hayward, C. (2006). Comorbid depression, chronic pain, and disability in primary care. *Psychosomatic medicine, 68*(2), 262-268.

Asnani, M. R., Fraser, R., Lewis, N. A., & Reid, M. E. (2010). Depression and loneliness in Jamaicans with sickle cell disease. *BMC psychiatry, 10*(1), 1-7.

Barakat, L. P., Lash, L. A., Lutz, M. J., & Nicolaou, D. C. (2006). Psychosocial Adaptation of Children and Adolescents With Sickle Cell Disease.

Beck, A. T., Ward, C. H., Mendelson, M., Mock, J., & Erbaugh, J. (1961). An inventory for measuring depression. *Archives of general psychiatry, 4*(6), 561-571.

Belgrave, F., & Molock, S. D. (1991). The role of depression in hospital admissions and emergency treatment of patients with sickle cell disease. *Journal of the National Medical Association, 83*(9), 777.

Chakravorty, S., & Williams, T. N. (2015). Sickle cell disease: a neglected chronic disease of increasing global health importance. *Archives of disease in childhood, 100*(1), 48-53.

Comer, E. W. (2004). Integrating the health and mental health needs of the chronically ill: a group for individuals with depression and sickle cell disease. *Social work in health care, 38*(4), 57-76.

Currie, S. R., & Wang, J. (2004). Chronic back pain and major depression in the general Canadian population. *Pain, 107*(1-2), 54-60.

Ferrari, A. J., Charlson, F. J., Norman, R. E., Patten, S. B., Freedman, G., Murray, C. J., Vos, T., & Whiteford, H. A. (2013). Burden of depressive disorders by country, sex, age, and year: findings from the global burden of disease study 2010. *PLoS medicine, 10*(11), e1001547.

Fu, T. S.-T., Lee, C.-S., Gunnell, D., Lee, W.-C., & Cheng, A. T.-A. (2013). Changing trends in the prevalence of common mental disorders in Taiwan: a 20-year repeated cross-sectional survey. *The Lancet, 381*(9862), 235-241.

Gil, K. M., Abrams, M. R., Phillips, G., & Keefe, F. J. (1989). Sickle cell disease pain: relation of coping strategies to adjustment. *Journal of Consulting and Clinical Psychology, 57*(6), 725.

Graves, J. K., Hodge, C., & Jacob, E. (2016). Depression, anxiety, and quality of life in children and adolescents with sickle cell disease. *Pediatric nursing, 42*(3), 113.

Hamideh, D., & Alvarez, O. (2013). Sickle cell disease related mortality in the United States (1999–2009). *Pediatric blood & cancer, 60*(9), 1482-1486.

Hasan, S. P., Hashmi, S., Alhassen, M., Lawson, W., & Castro, O. (2003). Depression in sickle cell disease. *Journal of the National Medical Association, 95*(7), 533.

Jenerette, C., Funk, M., & Murdaugh, C. (2005). Sickle cell disease: a stigmatizing condition that may lead to depression. *Issues in Mental Health Nursing, 26*(10), 1081-1101.

Jiya, F. B., Jiya, N. M., Ibitoye, P. K., Garba, B. I., Baba, J., Adamu, A. u., & Isezuo, K. O. Depressive symptoms among in-school adolescents in north-western Nigeria.

Jonassaint, C. R., Jones, V. L., Leong, S., & Frierson, G. M. (2016). A systematic review of the association between depression and health care utilization in children and adults with sickle cell disease. *British journal of haematology, 174*(1), 136-147.

Lanzkron, S., Carroll, C. P., & Haywood Jr, C. (2013). Mortality rates and age at death from sickle cell disease: US, 1979–2005. *Public health reports, 128*(2), 110-116.

Leavell, S. R., & Ford, C. V. (1983). Psychopathology in patients with sickle cell disease. *Psychosomatics, 24*(1), 23-37.

Levenson, J. L., McClish, D. K., Dahman, B. A., Bovbjerg, V. E., Citero, V. d. A., Penberthy, L. T., Aisiku, I. P., Roberts, J. D., Roseff, S. D., & Smith, W. R. (2008). Depression and anxiety in adults with sickle cell disease: the PiSCES project. *Psychosomatic medicine, 70*(2), 192-196.

Makani, J., Ofori-Acquah, S., Nnodu, O., Wonkam, A., & Ohene-Frempong, K. (2013). Sickle cell disease: new opportunities and challenges in Africa. The scientific world journal, 2013.

Molock, S. D., & Belgrave, F. Z. (1994). Depression and anxiety in patients with sickle cell disease: conceptual and methodological considerations. *Journal of Health & Social Policy, 5*(3-4), 39-53.

Murray, C. J., Vos, T., Lozano, R., Naghavi, M., Flaxman, A. D., Michaud, C., Ezzati, M., Shibuya, K., Salomon, J. A., & Abdalla, S. (2012). Disability-adjusted life years (DALYs) for 291 diseases and injuries in 21 regions, 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. *The Lancet, 380*(9859), 2197-2223.

Ngwengi, N. Y., Fon, P. N., & Mbanya, D. (2020). Distribution of haemoglobin genotypes, knowledge, attitude and practices towards sickle cell disease among unmarried youths in the Buea Health District, Cameroon. *The Pan African Medical Journal, 37*.

Novelli, E. M., & Gladwin, M. T. (2016). Crises in sickle

cell disease. *Chest, 149*(4), 1082-1093.

Ohayon, M. M., & Schatzberg, A. F. (2003). Using chronic pain to predict depressive morbidity in the general population. *Archives of general psychiatry, 60*(1), 39-47.

Oppong, M., Lamptey, H., Kyei-Baafour, E., Aculley, B., Ofori, E. A., Tornyigah, B., Kweku, M., & Ofori, M. F. (2020). Prevalence of sickle cell disorders and malaria infection in children aged 1–12 years in the Volta Region, Ghana: a community-based study. *Malaria journal, 19*(1), 1-11.

Piel, F. B., Patil, A. P., Howes, R. E., Nyangiri, O. A., Gething, P. W., Dewi, M., Temperley, W. H., Williams, T. N., Weatherall, D. J., & Hay, S. I. (2013). Global epidemiology of sickle haemoglobin in neonates: a contemporary geostatistical model-based map and population estimates. *The Lancet, 381*(9861), 142-151.

Sehlo, M. G., & Kamfar, H. Z. (2015). Depression and quality of life in children with sickle cell disease: the effect of social support. *BMC psychiatry, 15*(1), 1-8.

Simon, E., Long, B., & Koyfman, A. (2016). Emergency medicine management of sickle cell disease complications: an evidence-based update. *The Journal of emergency medicine, 51*(4), 370-381.

Smith, W. R., Penberthy, L. T., Bovbjerg, V. E., McClish, D. K., Roberts, J. D., Dahman, B., Aisiku, I. P., Levenson, J. L., & Roseff, S. D. (2008). Daily assessment of pain in adults with sickle cell disease. *Annals of internal medicine, 148*(2), 94-101.

Zorca, S., Freeman, L., Hildesheim, M., Allen, D., Remaley, A. T., Taylor, J. G., & Kato, G. J. (2010). Lipid levels in sickle-cell disease associated with haemolytic severity, vascular dysfunction and pulmonary hypertension. *British journal of haematology, 149*(3), 436-445.