Depression among Sickle Cell Anemia Patients in the Eastern Province of Saudi Arabia

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Abstract

Objectives: To determine the prevalence of, and factors associated with, depression among sickle cell anemia adult patients in the Eastern Province of Saudi Arabia.

Materials and Methods: A cross-sectional study was conducted between December 2014 and May 2015 among sickle cell anemia patients aged 16–70 years from the outpatient hematology clinics at Qatif Central Hospital. A total of 110 successive participants consented and answered an anonymous, self-administered, questionnaire and the Arabic version of the Beck Depression Inventory-II. Individuals were considered depressed if they scored ≥14 in Beck Depression Inventory-II. Simple logistic regression was used to compare differences between the depressed and nondepressed groups. Odds ratios (ORs) with 95% confidence intervals (95% CI) were reported.

Results: Depression was detected in 53 participants (48.2%). Bivariate analysis showed that lower educational qualification (OR = 2.5; 95% CI = 1.1–5.3; \( P = 0.021 \)), higher frequency of vaso-occlusive crises (OR = 3.4; 95% CI = 1.3–8.7; \( P = 0.008 \)) and frequent visits to the hematology clinic (OR = 5.3; 95% CI = 1.4–19.9; \( P = 0.008 \)) were significantly associated with depression.

Conclusion: This study revealed that there is high prevalence of depression among sickle cell anemia patients in the Eastern Province of Saudi Arabia.

Keywords: Depression, prevalence, Saudi Arabia, sickle cell anemia

INTRODUCTION

Sickle cell disease (SCD) is one of the most common hemoglobinopathies. It includes sickle cell anemia (SCA), sickle cell hemoglobin C disease, sickle beta thalassemia and others.[1] It is estimated that annually >300,000 children are born with SCD worldwide.[2] The disorder is inherited as an autosomal recessive disease and is characterized by sickling of the hemoglobin in the red blood cells.[1,3] SCA is the most severe form of SCD. Patients with SCA experience a wide spectrum of symptoms and complications such as acute chest syndrome, pulmonary hypertension, frequent painful episodes and osteomyelitis.[3] They have a shorter lifespan than the general population because of the increased susceptibility to major morbidities such as renal, respiratory and heart failures and stroke.[1,3] The median life expectancy in high-income countries is 40–60 years, but is much lower in low-income countries.[2,5] Furthermore, patients with SCA have been found to have significantly worse quality
In the United States, a historical cohort of SCA-related data from eight states showed that SCA is correlated with a high rate of acute care encounters and rehospitalization, which dramatically increases the overall cost of health care for these patients. For example, between 1989 and 1993, SCA-related hospitalizations cost the US government around USD475 million annually. In Saudi Arabia, SCA is prevalent in the Eastern and Southwestern regions. However, reliable statistical data on the prevalence of SCA in Saudi Arabia are currently not available. Nevertheless, efforts have been made by the Saudi Ministry of Health to lower the burden of the disease by implementing premartial screening and a genetic counseling program.

Similar to other chronic diseases, psychiatric difficulties and depression are common among patients with SCA. This can be attributed to many factors such as the chronic nature of the disease, severity of the symptoms and presence of psychosocial stressors. Previous studies in this field have tended to collectively examine the frequency of depression among SCA patients along with patients with different SCD genotypes. Over the past decade, the prevalence of depression in SCD adult patients has been estimated to be between 21.6% and 44% worldwide. A large study conducted in Nigeria to investigate the psychological impact of SCD in 408 participants reported that about 50% of the sample had depressive feelings. Asnani et al. examined the prevalence of depression in 277 SCD patients and 65 controls in Jamaica and reported a prevalence rate of 21.6% in SCD patients and 9% in the controls. In Saudi Arabia, there is no data about the prevalence of depression in SCA patients. Therefore, the aim of this study is to determine the prevalence of, and the factors associated with, depression among SCA patients in the Eastern Province of Saudi Arabia.

**MATERIALS AND METHODS**

This cross-sectional study was conducted between December 2014 and May 2015 at the outpatient hematology clinics of Qatif Central Hospital, which is a secondary care center located in the Eastern Province of Saudi Arabia. Consecutive sampling was used where SCA patients were recruited during their latest visit to the outpatient hematology clinics. This process resulted in a convenience sample of 110 patients. Participants were considered eligible for the study if they were Saudi, aged 16–70 years, diagnosed with SCA (HbSS) based on the hemoglobin electrophoresis and able to give informed consent. Patients known to have clinical depression or those treated for depression before enrollment in the study were excluded to avoid selection bias, which would potentially affect the ability of the study to assess factors associated with depression among the study sample.

Data were collected using anonymous, self-administered and structured Arabic questionnaire. The questionnaire elicited sociodemographic and disease severity-related information and comprised the Arabic version of Beck Depression Inventory-II (BDI-II). The sociodemographic data included age, gender, marital status, highest educational level, employment status and monthly income. In addition, questions about the genotype, frequency of vaso-occlusive crises (VOCs) and the frequency of visits to the hematology clinic were included. Frequency of VOCs was categorized into once or less every 4 months (classified as rare), once or more every month (classified as frequent) or other. The frequency of visits to the hematology clinic was categorized into three times or less every year (classified as rare), once or more every month (classified as frequent) or other. BDI-II was used to measure depression and the following cutoffs were used: an overall score of 0–13 indicates no depression, 14–19 indicates mild depression, 20–28 indicates moderate depression and 29–63 indicates severe depression. The Arabic version of BDI-II has an acceptable validity and reliability in Arabic-speaking populations. Based on Cronbach’s alpha, the estimated internal consistency reliability for the scale ranged from 0.82 to 0.93 in these populations. In our study, the internal consistency reliability of BDI-II scale measured using Cronbach’s alpha was 0.86.

The information collected from the individuals was coded and entered in a dataset created in Statistical Package for Social Science version 21 (IBM SPSS Statistics for Windows, IBM Corp., Armonk, NY, USA). Descriptive statistics was reported as percentage and frequency for both categorical and continuous data (after the conversion into categorical variables). The age variable was divided into two categories: ≤30 years and >30 years. The differences between depressed and nondepressed individuals were tested using the simple logistic regression. Crude or odds ratios (ORs) were estimated for each of the variables along with the 95% confidence interval (CI). A significance level of 0.05 was set to determine statistical significance for all tests. In addition, any OR >1.5 was considered to be clinically significant.

Ethical approval for this research was received from the Institutional Review Board (IRB) of King Saud University,
Riyadh, Saudi Arabia (approval reference 14/4443/IRB), on 1st December 2014.

RESULTS

A total of 115 eligible patients were approached and 110 (95%) accepted to participate in the study. The individuals’ age ranged from 16 to 50 years, with a mean age of 31.7 years (standard deviation [SD] = 8.2). Of the 110 participants, 45.5% were ≤30 years old and 54.5% were >30 years old; 57.3% were males and 65.5% were married. School education was reported in 52.7%. The majority of the patients were employed (58.2%). However, 51.8% stated that they had a monthly income of ≤SAR 5000. Most of the participants (75.5%) described the frequency of their VOCs as rare, and only 24.5% reported frequent VOCs. The frequency of visits to the hematology clinic was reported as rare by the majority of the study population (86.4%) as compared with frequent clinic visits (13.6%) [Table 1].

The mean depression score of BDI-II for the study population was 13.5 (SD = 9.3), ranging from 0 to 39. About 48% (53) of the participating patients scored within the mild to severe range of depression; the remaining reported no depression symptoms. Table 2 displays the estimates with the 95% CI for each category.

Simple logistic regression was performed to determine the relationship between demographic and disease severity variables with depression [Table 3]. No statistical or clinical significant differences were noted for age, gender, marital status or employment status between the two groups (depressed and not depressed). However, persons with lower levels of education (OR = 2.5; 95% CI = 1.1–5.3; P = 0.02), higher frequency of VOCs (OR = 3.4; 95% CI = 1.3–8.7; P = 0.008) and higher frequency of visits to the hematology clinic (OR = 5.3; 95% CI = 1.4–19.9; P = 0.008) had an increased risk of being depressed.

DISCUSSION

SCA, the most severe form of SCD, has a high prevalence rate in the Eastern and Southwestern regions of Saudi Arabia.[1,9] In general, depression is common among SCA patients, given its severity of symptoms and its debilitating effects.[13-19] However, in Saudi Arabia, there was no data specifically available regarding the prevalence of depression among SCA patients. Our study, using the BADI-II scale with a cutoff of ≥14, found that depression is prevalent in almost half (48.2%) of SCA patients from the Eastern Province of Saudi Arabia. This finding is higher than that of other studies that reported a prevalence of depression among SCD adult patients [Table 4].[14-19] The high prevalence rate in our study may be expected considering that the study population suffered from the severest form of the disease, i.e., HbSS.

Depression is among the top five leading causes of disability in Saudi Arabia.[23] Prevalence of depression among different subpopulations, including primary health-care patients, secondary school students and the elderly, has been reported from different regions of the country.[24-27] Compared with these studies, the rate of depression found among SCA patients of the current study is high.[25,26] Moreover, few studies have reported a similar or higher rate of depression among non-SCD cohorts.[24,27] This discrepancy might be explained by the use of different depression scales with different sensitivities and specificities.

The results of the current study showed that individuals with only school education were at a higher risk of

| Table 1: Demographic and clinical characteristics of 110 sickle cell anemia patients |
|---------------------------------|-----------------|
| Variable                        | Frequency (%)   |
| Age ≤30                         | 50 (45.5)       |
| Age >30                         | 60 (54.5)       |
| Gender Male                     | 63 (57.3)       |
| Gender Female                   | 47 (42.7)       |
| Marital Status Single           | 38 (34.5)       |
| Marital Status Married          | 72 (65.5)       |
| Educational qualification School education | 58 (52.7) |
| Educational qualification University or college | 52 (47.3) |
| Employment status Not employed  | 46 (41.8)       |
| Employment                      | 64 (58.2)       |
| Monthly income SAR ≤5000        | 57 (51.8)       |
| Monthly income SAR >5000        | 53 (48.2)       |
| Frequency of vaso-occlusive crises Frequent | 27 (24.5) |
| Frequency of vaso-occlusive crises Rare | 83 (75.5) |
| Frequency of visits to the hematology clinic Frequent | 15 (13.6) |
| Frequency of visits to the hematology clinic Rare | 95 (86.4) |

| Table 2: The depression status of 110 sickle cell anemia patients |
|---------------------------------------------------------------|
| Depression status                                            | Frequency (%) | 95% CI |
| No depression                                                | 57 (51.8)     | 42.5-61.2 |
| Mild depression                                              | 28 (25.5)     | 17.3-33.6 |
| Moderate depression                                          | 16 (14.5)     | 8.0-21.1  |
| Severe depression                                            | 9 (8.2)       | 3.1-13.3  |

CI – Confidence interval
developing depression than individuals with a university or college education. These findings are consistent with the results of Hasan et al., who showed that SCD patients with lesser than high school education were more prone to depression. A low level of education in patients with SCA might be expected because of school absenteeism in children and early school dropout by adults due to clinical complications of the disease and deteriorating health.

This study found that patients with a low monthly income (SAR ≤5000) have nearly a twofold higher risk of developing depression than patients with high monthly income (SAR >5000). However, statistical significance was not achieved, most probably owing to the small sample size. Similar findings were reported by Hasan et al. In SCA patients, low educational level, the chronic nature of the disease and the frequent hospitalization may result in them being unable to hold or sustain permanent employment, subsequently causing financial difficulties. Unemployment and financial strains have been found to be major triggers of depression in SCD and SCA patients.

Our results also indicated that patients with frequent VOCs were at a greater risk of developing depression than those with less frequent events. These findings are consistent with the findings from previous studies. Such an association could be expected because VOCs are the main cause of painful episodes, serious morbidities and frequent hospitalization among SCA patients, i.e., a worsening course and burden of the disease.

Our findings of higher risk of depression among patients who reported frequent hospital or clinic visits are also coherent with the findings of Asnani et al. Frequent health-care provider contact may be a proxy for severity of the disease and increased frequency of acute episodes, which can lead to depression.

The results of this study indicate that health-care providers need to routinely look for both physical and psychological health problems in patients with SCA, with appropriate use of antidepressants and psychotherapy and psychiatric referral when needed. Health-care providers should play an active role in improving the quality of life for these at-risk patients.

The authors believe further research is needed to determine the factors that will improve the quality of life for SCA patients in the Saudi community, with subsequent development of guidelines specific for the physical and psychological management of these patients.

The authors acknowledge the limitations of this study including its small sample size, which makes it difficult to reach a significant conclusion for some risk factors for depression. In addition, the study was conducted in only one hospital, which makes it less representative of all SCA patients in the Eastern Province. This study did not examine or assess the health-related quality of life in our patients, and thus were unable to evaluate the association between this factor and depression. Furthermore, this study did not evaluate other

### Table 3: Sociodemographic and clinical characteristics of the 53 sickle cell anemia patients with depression

| Variable                        | Depression, n (%) | OR† | 95% CI       | p  |
|---------------------------------|-------------------|-----|--------------|----|
| Age                             |                   |     |              |    |
| >30                             | 30 (50.0)         | 1.2 | 0.6–2.5      | 0.68|
| ≤30                             | 23 (46.0)         | 1.0 |              |    |
| Gender                          |                   |     |              |    |
| Male                            | 31 (49.2)         | 1.1 | 0.5–2.3      | 0.80|
| Female                          | 22 (46.8)         | 1.0 |              |    |
| Marital Status                  |                   |     |              |    |
| Single                          | 18 (47.4)         | 1.0 | 0.4–2.1      | 0.90|
| Married                         | 35 (48.6)         | 1.0 |              |    |
| Educational qualification       |                   |     |              |    |
| School education                | 34 (58.6)         | 2.5 | 1.1–5.3      | 0.02*|
| University or college           | 19 (36.5)         | 1.0 |              |    |
| Employment status               |                   |     |              |    |
| Not employed                    | 22 (47.8)         | 1.0 | 0.5–2.1      | 0.95|
| Employed                        | 31 (48.4)         | 1.0 |              |    |
| Monthly income                  |                   |     |              |    |
| SAR ≤5000                       | 31 (54.4)         | 1.7 | 0.8–3.6      | 0.18|
| SAR >5000                       | 22 (41.5)         | 1.0 |              |    |
| Frequency of vaso-occlusive crises |             |     |              |    |
| Frequent                        | 19 (70.4)         | 3.4 | 1.3–8.7      | 0.008*|
| Rare                            | 34 (41.0)         | 1.0 |              |    |
| Frequency of visits to the hematology clinic |               |     |              |    |
| Frequent                        | 12 (80.0)         | 5.3 | 1.4–19.9     | 0.008*|
| Rare                            | 41 (43.2)         | 1.0 |              |    |

*Statistically significant. †Simple logistic regression; CI = Confidence interval; OR = Odds ratio

### Table 4: Studies with prevalence rates of depression among sickle cell disease adult patients

| Study                | Year | Tools                  | Population                                      | Prevalence in SCD (%) |
|----------------------|------|------------------------|-------------------------------------------------|-----------------------|
| Hasan et al.         | 2003 | BDI                    | 27 males and 23 females with SCD                | 44                    |
| Jenerette et al.     | 2005 | BDI-FS                 | 232 African American with SCD                  | 26                    |
| Laurence et al.      | 2006 | CES-D                  | 102 SCD patients and 103 without SCD           | 38.6                  |
| Levenson et al.      | 2008 | Daily diaries for 6 months | 308 SCD adults                                         | 27                    |
| Edwards et al.       | 2009 | BDI                    | 30 males and 37 females with SCD                | 22                    |
| Asnani et al.        | 2010 | BDI-II                 | 277 SCD patients and 65 controls               | 21.6                  |

SCD – Sickle cell disease; BDI – Beck depression inventory; BDI-FS – Beck depression inventory fast screen; CES-D – Center for Epidemiologic Studies–Depression Scale; BDI-II – Beck Depression Inventory-II
important characteristics such as patients’ complications, nutritional status, adherence to treatment and other comorbidities, all of which have an influence on depression. Another limitation of this study is the use of BDI-II for the assessment of depression. Although BDI-II is a validated measure of depression, a structured clinical interview may have been a more robust approach. Finally, multiple logistic regression was not carried out because of the small sample size, which makes our results at risk of confounding.

CONCLUSION

The prevalence of depression among SCA patients identified in this study is high. Frequency of VOCs, frequency of visits to the clinic, educational level and low monthly income are the most significant factors associated with depression in SCA patients. Our findings support the hypothesis that depression in patients with SCA could be associated with demographics and disease severity factors.

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Conflicts of interest

There are no conflicts of interest.

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