Promising anti-sickling and fetal hemoglobin inducing effects of *Boerhavia diffua* root extract on sickle cell erythrocytes obtained from Sickle Cell patients of South Gujarat.

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Sickle cell disease (SCD) is a genetic blood disorder and currently available drugs are ineffective and come with numerous side effects *B. diffusa* has been reported as an important herb in the ayurvedic texts. Although studies have shown immunomodulatory and anti-inflammation activities, the anti-sickling activity and fetal hemoglobin (HbF) inducing potential of *Boerhavia diffusa* have not yet been explored. Therefore, the present study was aimed to assess anti-sickling and HbF induction effects of *B. diffusa* aqueous root extract in sickle cell erythrocytes obtained from SCD patients. The *in vitro* anti-sickling activity of the extract was evaluated microscopically via the Emmel Test. The HbF inducing activity of the extract was determined on SCD erythrocytes through HPLC. The different doses and time-dependent treatments of the test extract and drug control (hydroxyurea) suggested that 30 mg/mL extract for 60 min exerts significant anti-sickling effect on SCD erythrocytes compared to the negative control ($P < 0.0001$). The anti-sickling activity of test extract was comparable to hydroxyurea. Moreover, the test extract showed significant increased HbF% in SCD patients' erythrocytes at 30 mg/mL concentration for 120 min compared to negative control ($P < 0.0001$). The test extract showed similar HbF inducing potential when compared to hydroxyurea. In addition, the percentage of sickling was remarkably reduced with treatment of test extract in both severe and less severe SCD groups compared to negative control. The test extract and hydroxyurea were found to have similar anti-sickling effects irrespective of the severity of the disease. Overall, these results show for the first time the potent anti-sickling and HbF inducing activity of aqueous root extract of *Boerhavia diffusa*, which may be used as an herb-based alternative therapy in SCD patients, warranting future *in vivo* studies.