**Abstract**

Sickle hemoglobin (HbS) formed by the point mutation in the genetic code of beta-globin chain leading to valine substituting glutamic acid at position 6 of the beta-chain. The resultant sickle cell disease (SCD) characterized by occlusion of microvasculature by red blood cells is associated with multiple organ pathologies. One of such complications is chronic leg ulcers. We report a case of chronic leg ulcer, in a known sickle cell anemia patient, which did not respond to the wound dressing methods at the hospital’s disposal. The ulcer was successfully treated using standard operative procedure (S.O.P) in wound care, applying local honey, and use of blood transfusion. EA was a 20-year-old university undergraduate who was admitted to April 2019 in Central Hospital Benin City with chronic leg ulcer of 1 year duration. She was also anemic with hemoglobin concentration of 3.0 g/dl (packed cell volume 15%). The wound was dressed with local honey, and anemia corrected with blood transfusion using concentrated red cells lacking the HbS trait. There was a progressive improvement in the healing of the ulcer with total closure after 4 months of treatment. Maintenance and follow-up measures were instituted to prevent reoccurrence. This report showed that honey has remarkable properties in promoting wound healing. Its usage in combination with transfusion of HbA red blood cells to manage chronic leg ulcers in SCD patients is advocated. However, this calls for further studies and research.

**Keywords:** Chronic, HbAA, honey, leg ulcer, sickle cell disease

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**Résumé**

Sickle Hemoglobin (HbS) formé par la mutation ponctuelle dans le code génétique de la chaîne bêta-globine conduisant à la valine substituant l’acide glutamique à la position 6 de la bêta-chaîne. La drépanocytose résultante est caractérisée par l’occlusion de la microvasculature par les globules rouges malades avec les pathologies multiples associées d’organe. Une de ces complications est les ulcères chroniques de jambe. Nous rapportons un cas d’ulcère chronique de jambe dans un patient connu d’anémie de drépanocytose qui n’a pas répondu au pansement de blessure à la disposition des hôpitaux. L’ulcère a été traité avec succès en utilisant la procédure d’opération standard dans les soins de blessure, en appliquant le miel local et l’utilisation de la transfusion sanguine. Patient était une étudiante de 20 ans qui a été admise à l’hôpital central de la ville du Bénin en avril 2009 avec des antécédents d’ulcère chronique de jambe d’une durée d’un an. Elle était également anémique avec la concentration d’hémoglobine de 3.0g/dl (Volume de cellules emballées 15%). La blessure était habillée avec du miel local et l’anémie a été corrigée avec la transfusion sanguine utilisant des globules rouges concentrés manquant du trait de HbS. Il y avait l’amélioration progressive dans la guérison de l’ulcère avec la fermeture totale après quatre mois de traitement. Des mesures d’entretien et de suivi ont été mises en place pour prévenir la récidive. Ce rapport a montré que le miel a des propriétés remarquables dans la promotion de la cicatrisation des plaies. Son utilisation en combinaison avec la transfusion de globules rouges HbA pour gérer les ulcères chroniques de jambe dans les patients de SCD est préconisée. Toutefois, cela exige d’autres études et recherches.

**Mot clé:** Chronique, HbAA, miel, ulcère des jambes, drépanocytose

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**INTRODUCTION**

Sickle cell disease (SCD) is an autosomal recessive hemoglobinopathy caused by the substitution of glutamic acid by valine at the 6th position of beta globin chain. This results in the formation of sickle hemoglobin (HbS), a defective and abnormal hemoglobin molecule which leads to sickling of blood cells resulting to vaso-occlusion, ischemia, hemolytic anemia, and organ damage. SCD is a multiple organ pathology and hence manifests in diverse ways such as bone pain crises, avascular necrosis of the head of femur, pulmonary hypertension, and leg ulcers.

Globally, about 312,000 neonates are born annually with SCD and more than two-thirds (75%) of these occur in Africa. The prevalence of leg ulcers varies geographically widely ranging from 75% in Jamaica to 1% in Saudi Arabia. Male adults with SCD with low socio-economic status have the highest incidence of leg ulcer. Leg ulcers have been regarded as a marker of severity of the disease. Ulcer usually occurs in the lower limbs in area with very little subcutaneous fat and low blood flow especially the medial malleoli which is more affected than the lateral malleoli.

The main clinical feature of sickle cell leg ulcers is their slow and indolent clinical course and high rate of recurrence irrespective of therapies. Some studies showed a recurrence of between 80% and 97% after 2 years of wound healing and closure. Recurrence has been a worrisome challenge due to its associated morbidity, loss or decreased functionality, and overall impaired quality of life. These characteristics make chronic wound care an essential adjunct in the management and care of SCD patients.

There are many therapies being used for the care of leg ulcers but none of these treatment modalities have incorporated the use of honey and fresh red cell transfusion from blood donors without sickle cell trait. This case report therefore aims at showcasing the efficacy of honey usage in conjunction with fresh red cells transfusion in the treatment of recalcitrant chronic leg ulcer.

**CASE REPORT**

EA was a 20-year-old known SCD female undergraduate in one of the Nigerian Universities. She was diagnosed of sickle cell anemia (HbSS) when she was 8 years and has been receiving medicare at sickle cell center, Benin City, Edo State, Nigeria since childhood. She was regular with her routine follow-up visits at sickle cell center.

She was admitted to the Central Hospital Benin City, Nigeria on April 05, 2019 on account of anemia and chronic leg ulcer of 11 months’ duration. There was no improvement in the healing process as a result of poor wound care. She has been on hydroxyurea, oral Vitamin C, zinc tablets, folic acid, and antibiotics (oral ampiclox). She was admitted with a packed cell volume (PCV) of 15%. Her stable PCV was 22%. Her urine analysis, electrolytes, and urea were normal.

After 4 months, there was total healing and closure of the ulcer. The hematologists were consulted to see her. On examination, she was pale, dehydrated, and jaundiced. Her pulse rate was 112 beats/min while her blood pressure was normal. The abdomen and chest were essentially normal. The musculoskeletal system be beats/min while her blood pressure was normal. The abdomen and chest were essentially normal. The musculoskeletal system

![Figure 1: The chronic recalcitrant leg ulcer before commencement of honey dressing](image)

The wound was decontaminated with 70% alcohol. Wound was cleansed with sterile saline and debrided of nonviable slough and necrotic material prior to sampling for microbial culture. The margins of the wound was separated to avoid touching the wound edge with the sterile swab. The tip of the swab stick was extended deeply to reach the base of the lesion and rotated over the area of viable tissue, using sufficient pressure to extract fluid from the wound tissue and transported immediately to the laboratory for microbial culture. Wound swab for microscopy, culture, and sensitivity yielded growth of *Staphylococcus aureus* which was sensitive to clavulanic acid and amoxicillin. This necessitated her being placed on oral Augmentin 625 mg bid and had wound debridement. She was transfused with freshly donated packed cells, the donated or transfused blood were screened for sickle cell trait using standard methods to ensure only blood without the S-hemoglobin were transfused. She had red cell transfusion twice weekly till her PCV rose to 30% (hemoglobin concentration of 10.0 g/dL) as a part of hypertransfusion regimen. This was maintained for 4 months with top-up transfusions. The wound was dressed twice daily with original unadulterated honey procured from local bee-honey vendors/farmers. The wound dressing with honey was reduced to once daily after 6 weeks following a remarkable improvement with new granulation tissues and epithelization with consequent cessation of fluid exudation.

After 4 months, there was total healing and closure of the ulcer. The patient was seen at the hematology
blood transfusion has been advocated for the treatment of sickle cell trait. We recommend case-controlled studies using large population of SCD patients to corroborate this observation on the effectiveness and efficacy of honey-dressing in chronic recalcitrant leg ulcers among sickle cell patients.

Declaration of patient consent
The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

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Figure 2: The healing effect of honey and fresh red cell transfusion on chronic leg ulcer

We specifically requested the use of hemoglobin-AA packed red cells in the transfusion therapy of this patient. Even though blood transfusion has been advocated for the treatment of sickle cell ulcers, however, there are no controlled trials to show its efficacy. The objective of blood transfusion in the treatment chronic leg ulcers in SCD patients is to transfuse enough packed red blood cells to increase the oxygen carrying capacity of the blood by raising the hemoglobin to 10.0 g/dL thereby reducing the hemoglobin-S to <30%. To avoid transfusing red cells containing HbS, packed cells without sickle cell trait are used which would reduce the concentration of HbS far better and faster than HbS-containing cells.

CONCLUSION
Honey kick-starts healing of chronic wounds that have remained nonhealing for long periods of time. There is better outcome when combined with correction of anemia through transfusion of fresh red cells lacking the sickle cell trait. Nutrition and regular follow-up visit to the hematology clinic on Tuesday September 10, 2019, and she was doing very well. Most importantly, she was tutored and counseled against recurrence which has been documented to occur in 80%–97% of cases after 2 years of wound healing. The counseling included the use of appropriate foot wears, strict adherence to prescribed medications, personal hygiene, and nutrition and regular follow-up visit to the hematology clinic.

DISCUSSION
Several wound dressing pharmaceutical products such as savlon (chlorhexidine), hydrogen peroxide, and gentian violet have been used for this patient by nurses assigned to wound care and dressing but the ulcer had remained recalcitrant for 12 months. However, the commencement of honey dressing and transfusion of fresh red blood cells devoid of sickle cell trait led to remarkable improvement in the healing of the wound. After one week of dressing the wound with honey, the offensive odor stopped. This was one of the effects of using honey in wound dressing. Unlike pharmaceutical products which contains wound healing properties in every respective product, all these wound-healing characteristics are contained in honey making it stand out over pharmaceutical agents. Furthermore, the added advantage of physical properties of honey creating moist healing environment which has anti-bacterial activity removes all likelihood of moist conditions favoring bacterial growth. The combination of antibacterial and anti-inflammatory activity within honey, in addition with the debriding action of detaching slough may explain why honey can so readily bring about the healing of chronic wounds.

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