# ABSTRACT

**Introduction:** SCD is known to exhibit great clinical diversity. Though the same disease, the effect of disease complications varies significantly from one individual to another. Classification of individuals into disease severity groups can help detect which severity group they belong to and respective care given accordingly based on their needs. Hemoglobin F (HbF) is the major genetic modifier of clinical expression in sickle cell disease (SCD), and high levels of HBF are known to improve survival by decreasing intracellular polymerization of hemoglobin S, theoretically affecting downstream vaso-occlusive and hemolytic complications, but in some instance, the high level of HbF can be found in patients with severe clinical phenotype. LDH activity increases significantly during acute painful vaso-occlusive crises (VOCs) with a steady state, even in uncomplicated episodes.

**Method:** This was a cross-sectional study that was conducted at Bugando Medical Centre in Mwanza, Tanzania among SCD patients aged 6 months and above. A simple random sampling method was employed to get a total of 130 SCD patients. A designed patient report form was used to capture the clinical history and laboratory test results for SCD patients.

**General objective:** To determine the relationship between fetal hemoglobin (HbF) level, lactate dehydrogenase (LDH), and SCD severity among patients with sickle cell disease (SCD) attending sickle cell clinic at Bugando Medical Centre, Mwanza, Tanzania.

**Results:** Of all,56.9% of the participants were males. Among the participants, 7.7%had severe clinical phenotypes (95%CI: 3.8-12.3), for the studied population. Significant statistical evidence was found for the severe clinical phenotype (SCP) with mean LDH levels of 810.97IU/L (95%CI: 559.31-1062.64) with a *p-*value =0.005.In comparison to the asymptomatic and moderate clinical phenotypes, the severe clinical phenotype had a significantly high mean HbF score value of 10.09% (95% CI: 7.44-13.74%) with a *p*-value of 0.024.

**Conclusion and recommendation:** There were higher levels of serum LDH and HbF in SCD patients with SCP than was to moderate clinical phenotype (MCP) and asymptomatic clinical phenotype (MCP). A study with a large number of SCD patients to be conducted would come out with generalizable results about the association between LDH, HbF, and disease severity among patients with SCD. Imaging should be used to rule out hip diseases.