Assessment of liver stiffness in liver iron overload among transfusion-dependent thalassaemia patient using shear wave elastography: A prospective study in a large haematology centre

Mohd Zulkimi Roslly[1], Assyifaa Nik Mazian[1], Siti Soraya Ab Rahman[1], Yap Yee Yee[2], Nizam Baharom[3]

[1]Radiology Unit, Faculty of Medicine and Health Sciences, Universiti Sains Islam Malaysia, 71800 Bandar Baru Nilai, Negeri Sembilan, Malaysia, [2]Hematology Department, Hospital Ampang, 68000 Ampang, Selangor, Malaysia, [3]Public Health Unit, Faculty of Medicine and Health Sciences, Universiti Sains Islam Malaysia, 71800 Bandar Baru Nilai, Negeri Sembilan, Malaysia

ABSTRACT

Introduction: Thalassaemia is a major health concern in Southeast Asia, with liver iron overload from chronic blood transfusions being a common and devastating complication. While MRI T2* has become the gold standard for non-invasive assessment of hepatic iron, its use is limited by high cost, limited accessibility, long waiting times, and risk of claustrophobia. This study aimed to evaluate the diagnostic performance of shear wave elastography (SWE), a novel ultrasound-based tool, as an alternative method for assessing liver iron overload besides MRI, and to explore its correlation with serum ferritin and other clinical parameters. **Materials and Methods:** This was a single-centre, prospective study conducted over one year involving transfusion-dependent thalassaemia patients undergoing routine MRI T2* assessment. Alongside MRI-derived T2* values and the corresponding liver iron concentration (LIC), ultrasound examination of the liver for SWE was performed on the same day to measure liver stiffness (in kPa). Statistical analyses were conducted to assess correlations between SWE, MRI T2*, serum ferritin, and other clinical variables. **Results:** Sixty patients were enrolled, with HbE-Beta Thalassaemia being the most prevalent subtype (60%). Half of the cohort had severe liver iron overload, and the mean serum ferritin level was 2,760 ng/mL. A significant moderate negative correlation was observed between serum ferritin and MRI T2* values (Rs = -0.388, p = 0.002), indicating that higher ferritin levels were associated with lower T2* values and greater hepatic iron deposition. A moderate positive correlation was found between liver iron concentration and SWE values (Rs = 0.361, p = 0.005), suggesting increased liver stiffness with higher iron levels. SWE demonstrated fair diagnostic performance for detecting severe liver iron overload, with an optimal cutoff of 6.75 kPa, yielding a sensitivity of 0.76 and specificity of 0.60. The area under the ROC curve (AUC) was 0.729 (95% CI: 0.602–0.856, p < 0.001). **Conclusion:** SWE shows potential as a reliable, non-invasive tool for evaluating severe liver iron overload, especially in the early changes in parenchymal stiffness. Nevertheless, MRI T2* remains the gold standard for hepatic iron assessment. Larger study is needed to explore the clinical utilities and reliability of SWE in the whole spectrum of liver iron overload in thalassaemia patients.

Keywords: MRI T2*, shear wave elastography, Thalassaemia, liver, iron