Controlled Attenuation Parameter for Assessment of Hepatic Steatosis in Indian Patients

Gyanranjan Rout[*], Saurabh Kedia[*], Baibaswata Nayak[*], Rajni Yadav[†], Prasenjit Das[†], Subrat K. Acharya[*], Deepak Gunjan[*], Vishwajeet Singh[‡], Mousumi Mahanta[*], Swatantra Gupta[*], Sandeep Aggarwal[§], Shalimar[*]

[*]Department of Gastroenterology, All India Institute of Medical Sciences, New Delhi, India, [†]Department of Pathology, All India Institute of Medical Sciences, New Delhi, India, [‡]Department of Biostatistics, All India Institute of Medical Sciences, New Delhi, India and [§]Department of Surgery, All India Institute of Medical Sciences, New Delhi, India

Background/Aims: The gold standard method for measurement of hepatic steatosis is liver histology. Controlled Attenuation Parameter (CAP) can measure hepatic steatosis non-invasively. We aimed to assess the accuracy of CAP for detection of hepatic steatosis. *Methods:* A total of 462 patients (May 2012–January 2017)—89 non-alcoholic fatty liver disease, 182 chronic hepatitis B, 88 chronic hepatitis C and 103 patients with other etiologies who underwent simultaneous liver biopsy and CAP estimation using Transient Elastography (TE) were included. Steatosis was graded as S0: steatosis in 0–5% of hepatocytes, S1: 6–33%, S2: 34–66% and S3: 67–100%. Receiver Operating Characteristic (ROC) curves were plotted to evaluate the accuracy of CAP in detecting hepatic steatosis. Predictors of CAP were assessed by multivariate linear regression model. *Results:* The mean age $\pm$ SD was 33.8 $\pm$ 11.6 years; 296 (64.1%) were males. On liver histology, steatosis grades S0, S1, S2 and S3 were seen in 331 (71.6%), 74 (16.0%), 39 (8.4%) and 18 (3.9%), respectively. The median CAP (IQR) values for S0, S1, S2, and S3 steatosis were 206 (176–252) dB/m, 295 (257–331) dB/m, 320 (296–356) dB/m, and 349 (306–363) dB/m, respectively. For estimation of $\geq$S1, $\geq$S2, and $\geq$S3 using CAP, AUROC were 0.879, 0.893, and 0.883, respectively. In multivariate analysis, only BMI (OR 1.18; CI, 1.11–1.26, $P < 0.001$) and grade of hepatic steatosis (grade 1, OR, 3.94; 95% CI, 1.58–9.84, $P = 0.003$; grade 2, OR 42.04; 95% CI, 4.97–355.31, $P = 0.001$ and grade 3, OR 35.83; 95% CI 4.31–297.61, $P = 0.001$) independently predicted CAP. *Conclusions:* CAP detects hepatic steatosis with good accuracy in Indian patients with various etiologies. (J CLIN EXP HEPATOL 2018;xx:1–9)

Hepatic steatosis is commonly seen in Non-Alcoholic Fatty Liver Disease (NAFLD), Alcoholic Liver Disease (ALD), and Chronic Hepatitis C (CHC) patients.[1,2] The presence of hepatic steatosis is associated with treatment failure in Chronic Hepatitis B (CHB) patients,[3] progression of hepatic fibrosis[4] and development of hepatocellular carcinoma in CHC.[5] In addition, hepatic steatosis is also associated with metabolic syndrome and its complications.[6] Therefore, estimation of hepatic steatosis is important in the management of patients. Till now, the gold standard for assessment of hepatic steatosis is liver biopsy. Liver biopsy is an invasive procedure with complications like pain, bleeding, sampling variability, and even a small risk of death (0.01%).[7] Moreover, it is not feasible to perform repeated biopsies to assess for changes in steatosis on follow-up.

Ultrasonography (US), Computed Tomography (CT), Magnetic Resonance Imaging (MRI) and Magnetic Resonance Spectroscopy (MRS) are some of the imaging methods available for noninvasive assessment of hepatic steatosis.[8] However, these techniques have limitations, including high operator-dependency of US, radiation exposure during CT, high cost and limited availability of MRI and MRS.[9–11] Thus, there remains an unmet need for a low cost, easily available, accurate and non-invasive method for detection of hepatic steatosis. Recent data suggests that Controlled Attenuation Parameter (CAP) correlates with steatosis on liver biopsy.[12] It can be used for steatosis detection and quantification. Prior studies have evaluated its accuracy in NAFLD,[13] ALD, HCV infection[14] and patients with CHB infection.[15] There is a paucity of Indian data on the predictive value of CAP for hepatic steatosis on liver biopsy. Therefore, the objectives of this study were: (i) to assess the diagnostic accuracy of CAP in assessing hepatic steatosis; and (ii) to assess the various factors affecting CAP values.