# Low phase angle is associated with cirrhosis and low muscle mass in chronic hepatitis C patients

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**Background**: Although the use of electrical bioimpedance (BIA) is impaired when patients with hepatic cirrhosis have ascites, oedema and electrolyte disturbances, the measurement of phase angle (PhA) in this population has been shown to be superior to anthropometric and biochemical methods for early detection of malnutrition. The PhA reflects the cellular integrity and normal values (according to sex and age) indicate preserved cellular activity. In patients with chronic hepatitis C (CHC), the role played by PhA has not been completely clarified. **Objectives**: To evaluate the prevalence of low PhA and its association with demographic, clinical and nutritional variables in CHC. **Methods**: We prospectively included 222 patients [mean age, $53.7 \pm 11.7$ years; males, 116 (52.3%); diabetes mellitus, 40 (18.0%); hypertension, 91 (41.0%); cirrhosis, 87 (39.2%); underweight (BMI, $<18.5 kg/m^2$ for adults and $<22 kg/m^2$ for elderly), 9 (4.1%)]. The diagnosis and staging of liver disease were based on clinical, biochemical, histological, and radiological criteria. The PhA values were classified into percentiles according to the age/sex and the $5^{th}$ percentile was adopted as cut-off point. Low muscle mass was defined as $<15^{th}$ percentile for mid-upper-arm muscle area (MAMA). Data were analysed in logistic regression models. **Results**: Low PhA and reduced MAMA were identified in 52 (23.4%) and 55 (24.8%) patients, respectively. The Aspartate aminotransferase to Platelet Ratio Index (APRI) in cirrhotic and non-cirrhotic patients was $3.4 \pm 2.8$ and $0.8 \pm 0.7$, $P \leq 0.001$, respectively. In the multivariate analysis, adjusted for age, body mass index and gender, low PhA was significantly and independently associated with cirrhosis (OR=3.74; 95% CI=1.68-8.31; $P$=0.001) and low MAMA (OR=5.66; 95% CI=2.56-12.68; $P \leq 0.001$) (Table 1). **Conclusion**: Low PhA is associated with negative conditions such as cirrhosis and low muscle mass. Reduced PhA is associated with poor clinical and nutritional prognosis in CHC patients.

| Variables | Multivariate Analysis | | |
|-----------|------------|---------|----------|
| | **Odds Ratio** | **95% CI** | ***P*-value** |
| Hepatic cirrhosis | 3.74 | 1.68 - 8.31 | 0.001 |
| Low MAMA value | 5.66 | 2.56 - 12.68 | ≤0.001 |

MAMA: Mid-upper-arm muscle area.

**Table 1.** Variables associated with low phase angle (PhA) values in the multivariate analysis adjusted for age, body mass index and gender.