

Abstract - Frailty in MASLD patients is associated with the presence of diabetes and the degree of liver fibrosis

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Introduction

Loss of muscle strength and mass has been identified as a predictive factor for mortality. It is now evident that the loss of muscle mass and function, or sarcopenia, plays also a significant role in the development and severity of advanced liver diseases. However, the links between muscle strength and the severity of the hepatic phenotype in earlier stages of steatotic diseases are still underexplored.

Aim

Our aim is to assess the relationships between muscle strength, frailty, and the severity of liver disease in MASLD patients.

Methods

In this prospective study, the frailty of MASLD patients was assessed using the liver frailty index (LFI), including a handgrip strength test for the dominant hand, a balance test, and the time required to perform five sit-to-stand. Forearm and quadriceps muscle strength were measured using handgrip and an isokinetic dynamometer (Cybex®). Hepatic disease severity was evaluated by transient elastography, based on the controlled attenuation parameter (CAP) and elasticity. The presence of diabetes was defined by hypoglycemic medication use. Insulin resistance was evaluated in non-diabetic patients using the HOMA-IR method.

Results

152 patients diagnosed with MASLD were included in this study. The demographic composition of the cohort demonstrated a balanced distribution between genders, with 49% females and 51% males. The mean age was 56 years (range: 19 to 78 years), and the mean body mass index (BMI) was 33 (range 22 to 60 kg/m²). There was a high prevalence of diabetes in the cohort, affecting 45% of participants. Metabolic parameters revealed a mean controlled attenuation parameter (CAP) of 328 dB/m, indicating severe hepatic steatosis. The mean liver elasticity was 8 kPa (range: 2 to 49 kPa). Among the patients assessed by transient elastography, 54 patients were classified as F0-F1 (36.5%), 48 patients as F2 (32.4%), 31 patients as F3 (20.9%), and 15 patients as F4 (10.2%). The mean handgrip strength was 39.1 kg for males and 20.3 kg for females ($p = 0.0001$). The mean quadriceps strength was 106.9 N-m in males and 72.9 N-m in females ($p = 0.0001$). Using the LFI, 51 patients (40%) were identified as robust, 70 (56%) as pre-frail, and 5 (4%) as frail. Quadriceps muscle strength was significantly lower in frail patients compared to the robust patients (mean strength: 46.7 vs. 111.8 N-m; $p = 0.0036$). Frailty was not associated with the degree of steatosis assessed by CAP or insulin resistance measured by HOMA-IR. However, frailty was associated with age ($r = 0.4559$, $p = 0.0001$). Besides age, the presence of diabetes was associated with increased frailty (mean LFI 3.3 vs. 2.96 in non-diabetic patients, $p = 0.0122$) and also higher liver elasticity (mean LFI: 2.97 in F0-F2 vs. 3.5 in F3-F4 patients; $p = 0.0008$).

Conclusions

Frailty and decreased muscle strength are associated with the essential components of MASLD, namely the presence of type 2 diabetes and the degree of liver fibrosis. Other factors such as age and gender should also be considered. This underscores a potential liver-muscle axis in the pathogenesis of the disease.