

INTRODUCTION

Sarcopenia defined by the European Working Group on Sarcopenia (EWGSOP2), comprising low muscle strength, low muscle quantity/quality, and low physical performance¹. In Chronic Liver Disease (CLD), sarcopenia is associated with HE, ascites, infection and is an independent risk factor for reduced survival^{3,4}. Prevalence of sarcopenia in cirrhotic patient is btw 23-60% and its more common with CP-C and ALD². Currently CT scan is gold standard tool for diagnosis of sarcopenia. It is expensive, neither readily available nor portable and leads to radiation exposure. Thigh US is a novel non-invasive technique, easy to perform at bed side. BIA is validated for diagnosis of sarcopenia, body composition analysis and nutritional status¹. We aim for validation of anterior thigh US to quantify sarcopenia in CLD using: Total muscle thickness (TMT) and Superficial fat thickness (SF).

METHODS AND MATERIALS

A prospective cross-sectional study of Functional muscle (hand-grip and sit-to-stand), Performance (gait speed), Muscle mass using B-mode US is being carried out in cirrhotic patients and validated using SECA BIA. Frailty liver index score (<https://liverfrailtyindex.ucsf.edu>). Stata 17.0 was used for statistical analysis with t-test and Pearson correlation.

Results 1

Patient Demographics

- 48 individuals recruited to date: 33 cirrhosis and 15 healthy controls.
- 30% of cirrhotic patients were actively drinking alcohol.
- Most patients were male (66%), with mean age 59 yrs (SD=2), BMI 29.44 kg/m² (SD=1.2) and MELD 11 (SD=4)

Anthropometric/physical measurements

- HC had higher BMI (p=0.06) and waist circumference (p=0.01), regardless of presence of ascites (p=0.01)
- Impaired functional muscle strength in cirrhotic patients was noted.
- HC had lower Sit-to-stand time (8.84 vs 14.36 secs, P= 0.0005) and gait speed (2.78 vs 5.64, P=0.05)

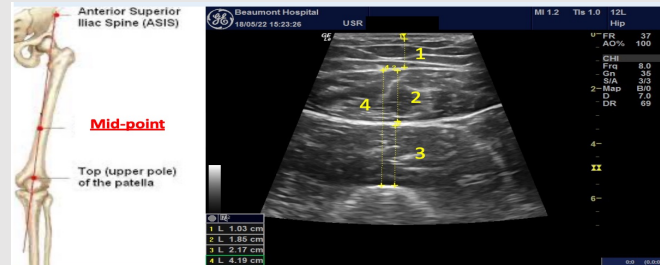


Figure 1. mid-thigh measuring point. Thigh US (1: Superficial Fat, 2: Rectus femoris muscle thickness, 3: Vastus Intermedius muscle thickness, 4: Total Muscle Thickness)

	Cirrrosis N=33	Healthy controls N=15	P-value
Age (Mean, SD)	59, 2	45, 2	0.0001
Male Gender (n)	22 (66%)	7 (46%)	
Aetiology	ALD (n=22) NASH (n=6) AIH (n=1) PBC (n=1) Cryptogenic (n=1) NASH/ASH/A1AT (n=1) HCV/HIV/ALD (n=1)		
MELD (mean, IQR)	11, 7-12		
Clinical Ascites	Female: 0 Male: 9 (41%)		
Liver frailty index, Frail	Female: 5 (45%) Male: 5 (23%)		
Active alcohol drinking	10 (30%)		
Smoker	16 (48%)	3 (20%)	0.06
BMI kg/m ² (Mean, SD)	29.44, 1.2	26.65, 0.73	
Albumin (mean, IQR)	39, 36-43		
Bilirubin (mean, IQR)	20, 9-41		
INR (mean, IQR)	1.2, 1.02-1.04		
Platelet (mean, IQR)	143, 94-183		
ALT (mean, IQR)	31, 21-36		
Waist circumference (cm) (Mean, SD)	101, 2	91.6, 3	0.01
Waist circumference, excluding ascites (cm) (Mean, SD)	103.6, 3	91.6, 3	0.006
TMT (mm) (mean, SD)	3.69, 0.2	4.4, 0.2	0.02
Vastus intermedius (VI) (Mean, SD)	1.45, 0.9	2.05, 0.1	0.0006
Rectus femoris (RF) (mean, SD)	1.9, 0.8	2.2, 0.1	0.05
SF (mm) (mean, SD)	1.42, 0.2	1.19, 0.1	0.26
Skeletal muscle mass (Kg) (Mean, SD)	24.2, 1.12	25.92, 1.55	0.39
Fat mass (Kg) (Mean, SD)	29, 3	22, 2	0.04
handgrip strength (Kg) (Mean, SD)	25, 2	38, 3	0.0005
Sit-to-stand (sec) (Mean, SD)	14.36, 1.24	8.84, 0.76	0.0005
Gait speed (sec) (Mean, SD)	5.64, 1.42	2.78, 0.5	0.05
Physical activity level (Mean, SD)	1.75, 0.03	1.92, 0.03	0.0001

Table 1.

Results 2

- hand-grip strength were higher in HCs (P= 0.0004) and HCs were more active (P=0.0001).
- Higher frailty index scores were associated with lower gait speed (p=0.001), ASMM/height² (p=0.06)

Anterior Thigh US and BIA

- Mean TMT was lower in cirrhotic cohort vs HC (3.69 vs 4.4, SD 0.2 vs 0.2 respectively, p=0.02)
- Lower TMT was associated with higher frailty index scores in cirrhotic patients (p=0.02)
- TMT did not correlate with MELD score in cirrhosis (p=0.06)
- Mean Fat mass measured with BIA was higher in cirrhosis vs HC (29 vs 22 kg, p= 0.04).

Validation of Ant. Thigh US use in CLD:

- BIA skeletal muscle mass strongly correlated with anterior thigh muscle thickness (r=0.54, p=0.0001) and BIA fat mass correlated with thigh US-measured SF (r=0.59. p=0.0001)

Conclusion

- There were strong correlation between thigh US and BIA measurements.
- Thigh Ultrasound is novel and potential new technique for diagnosis of muscle mass, fat mass and sarcopenia
- Further recruitment is underway to increase sample size and
 1. Validate thigh US as a marker of sarcopenia
 2. Determine association with prognosis and episodes of decompensation
 3. Calculate cut off value for thickness of superficial fat and total muscle thickness for diagnosis of sarcopenia.

References

1. Cruz-Jentoft AJ et al *Age Ageing* 2019
2. Xingxing Tantai et al. *Journal of Hep. Nov* 2021
3. Topan Mm et al. *Front Nutr* 2021 Oct 21
4. Bunchorntavakul C et al. *Aliment Pharmacol Ther.* 2020