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Body composition, nutritional status and clinical outcomes in end-stage liver disease

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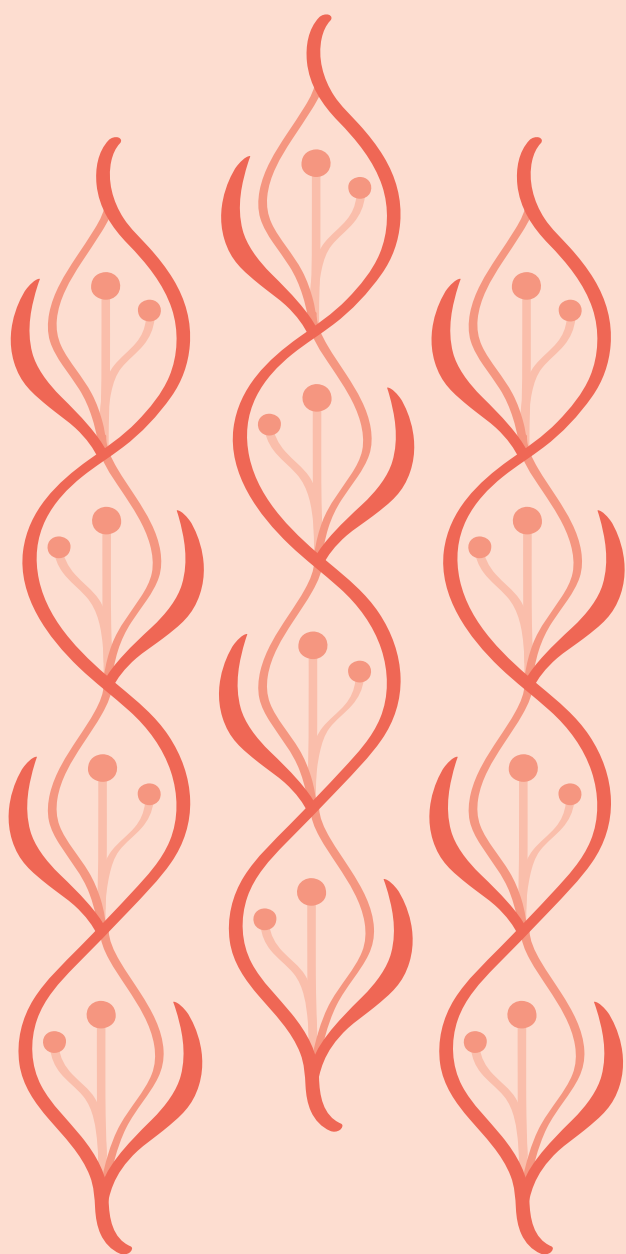
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PART III

CURRENT USE OF NUTRITIONAL ASSESSMENT TOOLS

(5)



Chapter 5

Nutritional assessment in patients with chronic liver disease - current accessibility and implementation

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Abstract

Background and Aims: Poor body composition is associated with impaired outcomes in patients with chronic liver disease (CLD), and various assessment tools are used. The aim of this study is to gain insight into the clinical practice of nutritional assessment in patients with CLD.

Methods: A semi-structured online survey on nutritional assessment tools for measuring body composition in patients with CLD was conducted among hepatologists and dietitians, mainly from hospitals between April 2023 and May 2023.

Results: A total of 45 eligible surveys were included in this study (dietitians N=35, hepatologists N=10). All dietitians had at least one nutritional assessment tool available. Bio-electrical impedance and handgrip strength were the most available and used. The most important reasons for assessment were diagnosis of nutritional status, evaluation of nutritional intervention and for assessing risk of mortality. A proportion of 49% of the dietitians and 60% of the hepatologists respectively were familiar with the 'European society of parenteral and enteral nutrition Guideline Clinical Nutrition in Liver disease'. Only 13% of dietitians and 60% of the hepatologists knew the 'European Association for the Study of the Liver Clinical Practice Guidelines on nutrition in chronic liver disease' and only eight dietitians and one hepatologist used a protocol for nutritional assessment in patients with CLD.

Conclusion: The importance of measuring body composition in patients with CLD for diagnosing and monitoring nutritional status and for assessing risk of mortality is well-known by dietitians and most hepatologists. However, implementation of the current guidelines is substandard and should be improved.

Keywords: nutritional assessment, sarcopenia, chronic liver disease, body composition, dietitian, hepatologist

Introduction

Malnutrition and sarcopenia are highly prevalent in patients with chronic liver disease (CLD), especially in patients within the advanced stage, where the prevalence is estimated to be 30-70%. (1, 2) In CLD body composition and sarcopenia risk should be assessed, since sarcopenia is a strong predictor of morbidity and mortality. (3-6) Therefore, identifying patients with CLD and poor nutritional status or body composition is important for timely referral for nutritional and lifestyle interventions. (2, 3, 6, 7)

For all patients with liver disease the European society of parenteral and enteral nutrition (ESPEN) recommends a diagnostic evaluation of nutritional status, consisting of measurements of body composition, sarcopenia and energy expenditure. (6) Radiologic methods ((Dual-Energy X-ray Absorptiometry (DEXA), Computed Tomography Scans (CT) or Magnetic Resonance Imaging (MRI)) are recommended tools for assessment of the body composition. If these are not available phase angle (bio-electrical impedance) and handgrip strength can be used to assess the presence or absence of sarcopenia. (6) However, there is no recommendation by whom and when these measurements should be performed during the disease course. Nowadays, in practice most of these nutritional assessment measurements are performed after referral to a dietician, and often only in the end-stage of the liver disease. Although most of the patients with CLD could benefit from a complete nutritional assessment performed by a specialist, this is not integrated in all healthcare programs. The aim of the current study was to gain insight in the use of nutritional assessment tools for assessing body composition in patients with CLD in the Netherlands. Secondary aim was to get a better understanding of the perception of dieticians regarding their role in nutritional assessment and dietetic care for patients with CLD.

Methods

A semi-structured online survey was designed by the researchers in the online survey software Qualtrics and it was adjusted for dieticians or physicians. The survey was conducted between April 2023 and May 2023 among dieticians and hepatologists in the Netherlands. We contacted all Departments of Dietetics of hospitals in the Netherlands by email. Besides, we asked respondents from different networks of dieticians (Dieticians who participate in the Nutritional Assessment expert group and Gastroenterology and Liver expert group). In these networks, dieticians working in all areas (clinics, hospitals and out-of-hospital dieticians) were represented. Hepatologists (or nurse practitioners with hepatology specialization) were invited through the Dutch Association for Gastroenterologists and Hepatologists. Two weeks after the initial request, we send a reminder by e-mail. Only dieticians and hepatologists treating patients with CLD were included in this research. The questionnaire consisted of both open-ended and close-ended questions, with space for personal reaction and clarification if needed. First, demographic data were collected through close-ended questions for obtaining the participant characteristics. Second came questions aimed to gain insight into to following areas: (1) the availability of nutritional assessment tools,

(2) opinions on and current use of nutritional assessment tools, (3) therapeutic consequences of measurement outcomes and (4) knowledge and use of international guidelines and protocols for nutritional assessment in CLD. (5, 6) Table 1 shows the included questions.

Statistics

Data was reported as number and percentage. Analyses were performed using the Statistical Package for Social Sciences (SPSS) version 26.0 (Chicago IL, USA). The questionnaires were used for statistical analysis if a minimum of 30% of all questions were answered by the participants

Results

Participants characteristics

In total we received 66 questionnaires, 54 from dietitians and 12 from hepatologists (11 hepatologists and 1 nurse practitioner with hepatology specialization). From these 21 were insufficiently completed to be used for analysis, so 45 surveys were included in this study (dietitians N=35, hepatologists N=10). The demographic data of participants are shown in Table 2.

Availability of nutritional assessment tools

The availability of nutritional assessment tools is reported in Table 3. All dietitians who participated in this study had at least one nutritional assessment tool available to measure a patient's body composition. In most hospitals, both general as well as academic hospitals, a various number of nutritional assessment tools was available. Bio-electrical impedance measurement and handgrip strength were the tools most used by dietitians to get information about the body composition of these patients with CLD. Circumference measures were available in most working places, but they were never used. Radiologic methods to access a patient's body composition were available in some hospitals: CT scans accessible for body composition measurements were available and used for this purpose in 100% of the academic hospitals, and in 25% of the general hospitals. DEXA and MRI with the possibility to measure body composition were available in 4 (50%) and 5 (62.5%) academic hospitals respectively. However, they were barely used to analyze body composition. The majority of the dietitians (60%) was satisfied with the available nutritional assessment tools at their working place. Dietitians indicated satisfaction because of adequate availability, sufficient knowledge and skills and the reliability. Dietitians who indicated dissatisfaction gave as reasons: too high purchase costs, little availability in their center, insufficient knowledge, much time investment and insufficient reliability of the available methods (mostly bio-electrical impedance). In the specific case of decompensated liver disease, it was mentioned that measuring body composition in a simple and non-invasive way in cases of fluid imbalance -such as ascites- remained difficult. Of the hepatologists, 30% were satisfied with the available nutritional assessment tools. Lack of experience, insufficient knowledge, high costs and lack of urgency in the organization were reported as reasons for dissatisfaction. Only three hepatologists, all working in academic hospitals, reported

to be satisfied with the available nutritional assessment tools. Two out of six dieticians working in primary practice were performing nutritional assessment at a remote location. Ideally, according to most of the dieticians, nutritional assessment should be performed 'during the first intake and final consultation' (40%), followed by 'during intake for diagnostic reasons' (26%). In patients with hepatocellular carcinoma and liver cirrhosis, 26% of the dieticians reported that nutritional assessment should be performed during every consultation. Most of the dieticians (80%), would like to perform nutritional assessment more often in patients with CLD. The remaining 20% is already performing nutritional assessment at any moment they would like to. Of the participating hepatologists, 90% would like to use nutritional assessment more during the course of follow-up and treatment. Only one hepatologist indicated not to be willing to use nutritional assessment more often, because he thought that there was insufficient scientific evidence for these measurements. Barriers mentioned by dieticians to perform nutritional assessment were insufficient reliability of available tools (44%), insufficient personnel or time available to perform the measurements (44%), equipment not available (9%), lack of evidence (3%) and lack of knowledge (3%).

Current use and opinions on nutritional assessment tools

The use of nutritional assessment tools in patients with CLD is reported in Table 3. Bio-electrical impedance and handgrip strength are the tools that were used the most. Although most nutritional assessment tools were available in academic centers, not all of these tools were used. Most of the body composition measurements were performed by dieticians. Other disciplines, as suggested by the participants, that could perform the measurements were nurses and students. Both dieticians and hepatologists answered that the dietician is the most important professional conducting body composition measurements. Ideally, the body composition should be assessed at the start of dietetic consultation according to 55% of the dieticians and 60% of the hepatologists; this was followed by 'at every consecutive appointment with the dietician' (time between appointments not specified). In the opinion of one of the hepatologists, the medical doctor should perform nutritional assessment frequently during the disease course. The most important reason to perform nutritional assessment was 'to diagnose the individual nutritional status' (97% of dieticians and 90% of hepatologists), followed by 'for evaluation of nutritional intervention' (88% of dieticians) and 'for risk assessment for mortality' (80% of hepatologists).

Liver transplantation

A total of 28.6% of the included dieticians and 20% of the included hepatologists were treating patients with end-stage liver disease, screened or not for liver transplantation. Regular nutritional assessment is performed in these patients by 50% of the responding dieticians and 20% of the hepatologists. Reasons to perform nutritional assessment in these specific patient groups were 'to monitor: nutritional status' (100% of the dieticians and 50% of the hepatologists), 'to assess fat-free mass' (60% of the dieticians), 'to assess fluid disbalances' (60% of the dieticians), 'for nutritional interventions' (80% of the dieticians and 50% of the hepatologists) or because this was embedded in local procedures and protocols (40% of the dieticians and 50% of the hepatologists).

Therapeutic consequences of measurement outcomes

According to the participating dietitians the results of the body composition analysis were not used to make changes in dietary advice. Also, referral to a dietitian based on the results of the measurements was rare according to the dietitians. Of the included dietitians, 35.7% stated that referral for nutritional assessment never occurred in their working area. The other dietitians stated insufficient referral, which was mainly due to limited performance of nutritional assessment tools (43%), timing (21%) and other not specified reasons (28%). Half of the hepatologists reported to use the results of nutritional assessment outcomes for referral to another discipline, for example dietitians, physical therapists and lifestyle coaches.

Guidelines and protocols for use of nutritional assessment

Both the European Society of Parenteral and Enteral Nutrition (ESPEN) and the European Association for the Study of the Liver (EASL) have published recommendations regarding measurement of body composition in patients with liver diseases. The recommended tools are reported in Table 4. Only about half of the participants -dietitians (49%) and hepatologists (60%)- were familiar with the 'ESPEN Guideline Clinical Nutrition in Liver disease' regarding the use of nutritional assessment. Of the dietitians, only 12.5% knew the 'EASL Clinical Practice Guidelines on nutrition in chronic liver disease' regarding the use of nutritional assessment and 60% of the hepatologists knew these guidelines. Even if the guidelines were known, they were not followed in many centers: for example: 20% of the dietitians, and 30% of the hepatologists were not following the recommendations of ESPEN to assess the body composition in patient with CLD. All of the hepatologists who were (partially) following the ESPEN guidelines were working in academic hospitals (so none of the hepatologists in the other hospitals did). None of the participants stated to follow the EASL guidelines. Some followed non-liver disease specific guidelines. In primary care, none of the dietitians was familiar with one of the earlier mentioned guidelines. Only one of the hepatologists and eight dietitians reported a local protocol for performing nutritional assessment in patients with CLD in their hospital.

Discussion and conclusion

Although the importance of measuring body composition in patients with CLD is well studied, the current situation regarding the use of nutritional assessment in clinical care has not been clear yet. (6, 8) Our pilot study is the first to investigate the current use, opinions on and barriers for using nutritional assessment tools in order to assess the body composition of patients with CLD. We demonstrated that especially bio-electrical impedance analysis is available for patients with CLD and used for clinical care. Imaging techniques are mostly available in hospital settings, but many dietitians outside hospitals do not have easy access to these methods for analyzing body composition. The importance of measuring body composition is well-known to dietitians and most hepatologists acknowledge its importance for diagnosing nutritional status and for assessing risk of mortality. The most reported barriers for using nutritional assessment tools are lack of

experience and evidence, high purchase costs and the time it consumes. Although many dietitians and hepatologists know the international ESPEN guidelines and some know the EASL guidelines regarding nutritional assessment in patients with CLD, most do not use these in clinical practice.

Poor body composition, low skeletal muscle mass and function, with or without a high amount of adipose tissue, has been associated with poor clinical outcome and higher mortality risk. (3) Especially in patients with end-stage liver disease, including those awaiting liver transplantation, the prevalence of sarcopenia and myosteatosis is high. Due to the many metabolic functions of the liver, body composition will most likely worsen as disease progresses. (9) Therefore, comprehensive nutritional assessment, including analysis of body composition at an earlier stage, might help patients to achieve a better body composition before demanding treatments as transplantation or resection are required. (2, 6, 10) Our results showed that at this moment, nutritional assessment is not routinely performed, or only after referral to the dietitian for unwanted weight loss and local procedures. Palmese et al. showed that the nutritional intake of patients with liver cirrhosis waiting for liver transplantation is insufficient compared to the international standards. (11) Pro-active and adequate referral to a dietitian at an early stage of the disease might be helpful in preventing further decline of body composition by timely intervention. (12, 13)

Our study has some strengths and limitations. This study is the first pilot study among dietitians as well as hepatologists exploring the use of and opinion on measuring body composition in CLD. We invited all department of dietitians in hospitals in the Netherlands to participate in our study. This makes the outcomes of our study representative mainly for hospital dietitians, but less for those not working in a hospital/clinic setting. We used a semi-structured questionnaire including multiple open-end questions and space to add personal answers. Because of this design, we were able to gain as much information regarding the use and opinion of the respondents as they were willing to share. This study was initiated by dietitians, which might be the reason that the response rate among dietitians was higher than among hepatologists. Secondly, dietitians working in primary care and hepatologists were invited through specific networks, which might have led to some bias, especially considering that the dietitians working in primary care and hepatologists that were approached are part of this network due to their specific interest in nutrition and nutritional assessment. There may have been response bias, since only physicians interested in nutrition and body composition bothered to complete the survey. On the other hand this could imply that implementation of nutritional assessment in patients with CLD in the real world might be even worse. Our study was conducted in the Netherlands, although the results may be comparable to other western countries. Therefore larger international studies are recommended to extend and verify our results for generalizability. For this a collaboration with the European Federation of Associated Dietitians might be a possibility.

It is clear from the results that, despite the fact that the importance of measuring body composition is reasonably known by dietitians and hepatologists and at least one nutritional assessment tool is

available in almost all cases, implementation is lacking. Weimann et al. studied the perioperative nutritional strategies in 16 European transplants units. Nutritional assessment was performed with anthropometrics in 38% of the included centers. The used nutritional assessment tools were not reported. In their study, the majority had no formal pretransplant nutritional regime (69%) in contrast to a postoperative nutrition regime (69%). The study of Weimann et al. was conducted more than 25 years ago in end-stage liver disease, while our study included patients with less advanced chronic liver disease and end-stage liver disease, and was mainly focused on measuring the body composition. In our data there was no difference found between the treatment of patients with chronic liver disease in general and patient with end-stage liver disease found in the questionnaires of our respondents, and therefore we chose to show the results for all patients with chronic liver disease without selection, which might introduce bias. Like in the earlier study the absence of protocols and of implementation of guidelines is still remaining. (14) Therefore, despite some knowledge regarding international guidelines regarding nutritional assessment in CLD, further education is also warranted.

Increasing the knowledge of the existing guidelines regarding nutritional assessment of ESPEN and EASL, for example through network groups and symposia, can be a strategy to familiarize more dieticians and hepatologists with the guidelines. Both guidelines are composed by a large group of experts based on current literature. The ESPEN guidelines are slightly more recent (2020) compared to the EASL guidelines (2018). We especially recommend to use the guidelines of ESPEN, because these include the recommendation to use imaging techniques to assess individual body composition, which is the most reliable method for this purpose. When these techniques are not available, ESPEN recommends to perform bio-electrical impedance as second best. EASL recommends circumference measurements and triceps skinfold thickness in absence of computed tomography scans, which are both double indirect methods for assessing a patients body composition with high interobserver differences and less reliable compared to bio-electrical impedance. (5, 6) Possibly a repeated simple evaluation with bioimpedance measurement and handgrip strength, which are both present in almost every place, with intervals followed by available imaging techniques to screen for poor body composition, might be helpful for enabling early intervention. Routine referral to a dietician, lifestyle coach and/or physical therapist based on the measurements can be done by the treating physician. Afterwards, nutritional assessment tools can be used on a regular basis in order to evaluate the effect of the intervention on body composition, and to adjust these if needed. The data of our study show that much work is to be done in order to better implement the current guidelines on nutrition in patients with CLD.

Table 1. Questions included in online survey on nutritional assessment in chronic liver disease

	Dieticians	Hepatologists
Demographic data	General questions regarding gender, age, working place, working experience, type of patients, amount of patients treated	General questions regarding gender, age, working place, working experience, type of patients, amount of patients treated
Availability of NA assessment tools	• Are you familiar with NA tools? Y/N • Are NA tools used in your organization? Y/N • Which NA tools are available in your organization? MC and OE • Are you satisfied with the available NA tools in your organization? MC with clarification	• Are you familiar with NA tools? Y/N • Are NA tools used in your organization? Y/N • Which NA tools are available in your organization? MC and OE • Are you satisfied with the available NA tools in your organization? MC with clarification
Current use and opinion NA tools	• Which NA tools are used to determine BC in patients with CLD in your organization? MC and OE • Which NA tools are used to determine BC in patients with LC in your organization? MC and OE • Who is performing NA assessment in your organization? MC and OE • Who should be performing NA assessment in your organization in your opinion? MC and OE • Do you ever have performed NA assessment at a remote location to analyze BC? Y/N • How often should NA assessment be performed in patients with CLD? MC and OE • What added value do you see in the use of NA assessment in patients with CLD? MC and OE • What do you think are barriers for using NA tools in patients with CLD? MC and OE • Would you like to use NA more often in your treatment? Y/N and clarification	• Which NA tools are used to determine BC in patients with CLD in your organization? MC and OE • Which NA tools are used to determine BC in patients with LC in your organization? MC and OE • Who is performing NA assessment in your organization? MC and OE • Who should be performing NA assessment in your organization in your opinion? MC and OE • What added value do you see in the use of NA assessment in patients with CLD? MC and OE • What do you think are barriers for using NA tools in patients with CLD? MC and OE • Would you like to use NA more often in your treatment? Y/N and clarification

	Dietitians	Hepatologists
Therapeutic consequences of NA outcomes	• Do you adjust your dietetic treatment based on the outcomes of NA assessment? Y/N and clarification • In your opinion, Are adequate referrals made depending on the results of NA assessment? MC with classification • If applicable: are you using NA in the treatment of patients who are screened/ waiting for liver transplantation? Y/N and clarification	• Are the outcomes of NA used to refer to a specific intervention? MC with clarification • Are the outcomes of NA used to make health care decisions? MC with clarification • If applicable: are you using NA in the treatment of patients who are screened/ waiting for liver transplantation? Y/N and clarification
Guidelines and protocols for use of NA tools	• Do you have a protocol for using NA tools in your organization? MC and OE • Are you familiar with the 'ESPEN Guideline Clinical Nutrition in Liver disease' regarding the use of NA? Y/N • Are you following the ESPEN Guideline: 'Clinical Nutrition in Liver disease' regarding the use of NA? Y/N and clarification • Are you familiar with the 'EASL Clinical Practice Guidelines on nutrition in chronic liver disease' regarding the use of NA? Y/N and clarification • Are you following the 'EASL Clinical Practice Guidelines on nutrition in chronic liver disease' regarding the use of NA? Y/N and clarification • Are you using other guidelines (besides ESPEN and EASL) regarding NA in patients with CLD? OE	• Do you have a protocol for using NA tools in your organization? MC and OE • Are you familiar with the 'ESPEN Guideline Clinical Nutrition in Liver disease' regarding the use of NA? Y/N • Are you following the ESPEN Guideline: 'Clinical Nutrition in Liver disease' regarding the use of NA? Y/N and clarification • Are you familiar with the 'EASL Clinical Practice Guidelines on nutrition in chronic liver disease' regarding the use of NA? Y/N and clarification • Are you following the 'EASL Clinical Practice Guidelines on nutrition in chronic liver disease' regarding the use of NA? Y/N and clarification • Are you using other guidelines (besides ESPEN and EASL) regarding NA in patients with CLD? OE

Abbreviations: BC, Body Composition; EASL, European Association for the Study of the Liver; ESPEN, European Society for Clinical Nutrition and Metabolism; LC, Liver Cirrhosis; CLD, Chronic Liver Disease; NA, Nutritional Assessment; MC, multiple choice question; OE, open ended question; Y/N, yes or no question.

Table 2. Characteristics of participants Abbreviations: CLD, Chronic Liver Disease.

	Dieticians (N=35)	Hepatologists^a (N=10)
Gender (female)	35 (100%)	7 (70%)
Age		
20-30 years	11 (31.4%)	0 (0.0%)
30-40 years	8 (23.0%)	4 (40.0%)
40-50 years	14 (40.0%)	0 (0.0%)
50-60 years	1 (2.9%)	3 (30.0%)
60+ years	1 (2.9%)	2 (20.0%)
Missing	0 (0.0%)	1 (10.0%)
Working place		
Primary Practice	6 (17.1%)	NA
Non-academic hospital	21 (60.0%)	3 (30%)
Academic hospital	8 (22.9%)	7 (70%)
Working experience (years)		
0-1 year	3 (8.6%)	0 (0.0%)
1-2 years	3 (8.6%)	0 (0.0%)
2-5 years	7 (20%)	0 (0.0%)
5-10 years	9 (25.7%)	5 (50.0%)
>10 years	13 (37.1%)	5 (50.0%)
Weekly amount of patients with CLD		
<5 patients a week	26 (74.2%)	3 (30%)
5-15 patients a week	8 (22.9%)	5 (50%)
>15 patients a week	1 (2.9%)	2 (20%)

a Or Nurse Practitioners with Hepatology specialisation.

Table 3. Availability and use of nutritional assessment tools in dieticians

		Total (N=35)	Primary Practice	General Hospital	Academic Hospital
Bio-electrical impedance analysis	Available (%)	32 (91.4%)	6 (100%)	18 (85.7%)	8 (100%)
	Used in CLD (%)	19 (54.3%)	5 (83.3%)	9 (42.9%)	5 (62.5%)
Air Displacement Plethysmography	Available (%)	3 (8.6%)	0 (0.0%)	0 (0.0%)	3 (37.5%)
	Used in CLD (%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Computed Tomography (CT)	Available (%)	17 (48.6%)	0 (0.0%)	9 (42.9%)	8 (100%)
	Used in CLD (%)	2 (5.7%)	0 (0.0%)	0 (0.0%)	2 (25.0%)
Circumference measurements	Available (%)	13 (37.1%)	4 (66.7%)	4 (19.1%)	5 (62.5%)
	Used in CLD (%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Dual Energy Xray absorptiometry (DEXA)	Available (%)	5 (14.3%)	0 (0.0%)	1 (4.8%)	4 (50%)
	Used in CLD (%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Handgrip strength	Available (%)	34 (97.1%)	6 (100%)	20 (95.2%)	8 (100%)
	Used in CLD (%)	17 (48.6%)	2 (33.3%)	9 (42.9%)	6 (75%)
Triceps Skinfold Thickness (TSF)	Available (%)	8 (22.9%)	1 (16.7%)	4 (19.1%)	3 (37.5%)
	Used in CLD (%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Magnetic resonance imaging (MRI)	Available (%)	6 (17.1%)	0 (0.0%)	1 (4.8%)	5 (62.5%)
	Used in CLD (%)	1 (2.9%)	0 (0.0%)	0 (0.0%)	1 (12.5%)
Ultrasound	Available (%)	4 (11.4%)	0 (0.0%)	1 (4.8%)	3 (37.5%)
	Used in CLD (%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)

Abbreviations: CLD, Chronic Liver Disease.

Table 4. Recommended nutritional assessment tools in liver disease by ESPEN and EASL

Nutritional assessment tool	ESPEN	EASL
Bio-electrical impedance	X	
Circumference measurements		X
Computed tomography	X	X
DEXA	X	
Handgrip strength	X	X
MRI	X	
Triceps Skinfold Thickness		X

Abbreviations: DEXA, Dual Energy X-ray Absorptiometry; EASL, The European Association for the Study of the Liver; ESPEN, The European Society for Clinical Nutrition and Metabolism; MRI, Magnetic Resonance Imaging.

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