ORIGINAL ARTICLE

Validation Of Nutrition Screening Tool: Royal Free Hospital Nutritional Prioritizing Tool (RFH-NPT) For Chronic Liver Disease Patients

Norashimah Rajab[1], Syahrul Bariah Abdul Hamid[1,6], Aishah Hanum Mohd Said[3], Khairil Anuar Md Isa[3,4,5]

[1] Centre of Dietetics Studies, Faculty of Health Sciences, UiTM Puncak Alam, 42300 Selangor, Malaysia
[2] Dietetic and Food Service Department, Hospital Selayang, 68100 Batu Caves, Selayang, Malaysia
[3] Department of Basic Sciences Studies, Faculty of Health Sciences, UiTM Puncak Alam, 42300 Selangor, Malaysia
[4] Institute for Biodiversity and Sustainable Development (IBDS), Universiti Teknologi MARA, 40450 Shah Alam, Selangor, Malaysia
[5] Institute of Big Data Analytic and Artificial Intelligence (IBDAA), Universiti Teknologi MARA, 40450 Shah Alam, Selangor, Malaysia.
[6] Mother, Infant and Young Child Nutrition (MiChild) Research Group, Faculty of Health Sciences, UiTM Puncak Alam, 42300 Selangor, Malaysia

ABSTRACT

Introduction: Hepatic diseases patients are especially prone to malnutrition, which is often underestimated. Screening tools were developed to detect the risk of malnutrition. However, screening tools for patients with liver disease were frequently underestimated. Fluid overload is the main issue to perform nutritional screening in liver disease patients. Therefore, this study aimed to validate the Royal Free Hospital Nutritional Prioritizing Tool (RFH-NPT) among patients and to evaluate association between RFH-NPT, Nutritional Risk Screening (NRS 2002) and Subjective Global Assessment (SGA). **Methods:** This cross sectional study was conducted in 3 phases; transcultural adaptation, criterion validity and reliability phases. Content validity was confirmed by interviewing eight liver disease professionals. Face validity was assessed by surveying forty nurses working in the liver disease ward. In addition, agreement between NRS 2002 and RFH-NPT assessment was assessed using the SGA tool. **Results:** Eighty patients with liver disease took part in this study. The SGA assessment found malnutrition in 75% of patients (95% CI, 60%–95%) while 80% (95% CI, 65%-80) were found as at risk of malnutrition using RFH- NPT. Moderate specificity and high sensitivity of RFH-NPT were 97% and 74%, respectively, and 95% positive predictive value was measured. **Conclusion:** The RFH-NPT nutritional screening tool is the initial and most reliable in this population to assess the malnutrition risk. Thus, inclusion of the RFH-NPT with NRS 2002 demonstrated positive and a fair agreement between the SGA and RFH-NPT tool to be used as a routine nutrition screening protocol for identifying patients at risk of malnutrition.
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Keywords: Royal Free Hospital Nutritional Prioritizing Tool, Nutrition screening, Liver disease, Cirrhosis, Validation

Corresponding Author:
Syahrul Bariah Abdul Hamid, PhD
Email: syahrulbariah@uitm.edu.my
Tel: +60332584382

INTRODUCTION

In Malaysia, patients with advanced liver disease has a prevalence of 50 to 90 percent among cirrhotic patients (1). Malnutrition has significant complications of liver cirrhosis, with 60 to 90 percent prevalence worldwide (2). Malnutrition is connected to higher casualties, a higher occurrence of complications related to portal hypertension, longer hospital stays and infections (3). The benefits of nutrition therapy can be seen in reducing length of hospital stay, systemic inflammatory responses, infections and deaths in mixed groups of malnourished patients (4).

Specific study on cirrhosis are lacking by cohort size and study design, nutritional therapy has seen benefits (5). It is important to identify malnourished people so that nutritional therapy can be initiated early, as it is a potentially treatable condition. Thus, to decide whether a patient is at risk of malnutrition, patients will go through a rapid nutritional screening. For patients who are at risk, a comprehensive nutritional assessment must be done to establish whether malnutrition is present and how severe it is (6). Nutrition screening and assessment are rarely performed in patients with liver disease due

to lack of a validated fast nutritional screening tool, numerous definitions of malnutrition, and the difficulty of clarifying body composition and laboratory results in volume overload and liver dysfunction (7).

Malnutrition is the existence of nutrient instability as a result of poor nutrition, despite the fact that there is no commonly agreed definition. Malnutrition is defined as a nutritional condition that is associated with poor clinical consequences. The terms 'malnutrition' and 'undernutrition' should not be used interchangeably because malnutrition can be caused by a nutritional deficit as well as an excessive intake of nutrients or over nutrition. (8).

Due to the liver's role in controlling nutritional status and energy balance, patients who have hepatic diseases are prone to have higher risk of malnutrition. Additionally, chronic liver illness might lower appetite and reduce nutrient absorption. Therefore, the roots of malnutrition in hepatic diseases patients are complex (Table I) (9,10).

Nutritional screening is a practice to identify individuals who are at risk of malnutrition or malnourished for a recommendation to a complete nutritional assessment and appropriate therapeutic intervention, stated by American Society for Parenteral and Enteral Nutrition (ASPEN) (6). In addition, European Society for Clinical Nutrition and Metabolism (ESPEN) suggested fast and simple screening have to be carried out by admission team or community health care teams (11). An ideal screening tool would be easy to use by a non-trained healthcare provider or even for patient's usage, has adequate sensitivity and specificity (12).

Table I: Causes of malnutrition in liver diseases

Causes of Malnutrition	Details
Decreased intake of nutrients	- Abdominal distention (ascites, splenomegaly) - Nausea and vomiting - Anorexia-chronic oesophagitis and portal gastropathy - Encephalopathy-related decreased oral intake - Impaired gastric emptying - Iatrogenic causes (unnecessary restriction of protein for encephalopathy, repeated - Impairment of taste (zinc deficiency) - Inhibition of gluconeogenesis due to alcohol abuse - Alcohol-related malabsorption of some nutrients (folate, vitamin B12, thiamine, magnesium) - Poor socioeconomic status - Recurrent uncontrolled infections in cirrhotic patients
Metabolic derangements	- Insulin resistance and its consequences - Increase in resting metabolic rate
Malabsorption	- Impairment of bile flow in chronic cholestasis - Bacterial overgrowth - Concomitant chronic pancreatitis (particularly in alcoholic steatohepatitis) - Concomitant celiac disease with chronic autoimmune liver diseases (primary biliary cirrhosis, primary sclerosing cholangitis, autoimmune hepatitis) - Drug- or toxin-induced malnutrition - Use of cholestyramine and colestipol leading to lipid malabsorption - Metformin use for insulin resistance leading to vitamin B12 deficiency - Chronic steroid use leading to calcium and vitamin D malabsorption

For high-risk patient groups, a daily system-wide nutritional screening is not commonly performed. Moreover, malnutrition expands the economic burden of cirrhosis as prevention strategies are neglected (13). Thus, those who are malnourished or at risk are typically overlooked until they become severely malnourished or have a serious health problem that requires treatment. The connection between inflammation and malnutrition, which is dictated by nutritional status and disease severity, is considered in determining nutrition risk (14). Nutrition risk, according to ESPEN, is the likelihood of a better or worse outcome of an illness or surgical intervention based on nutritional and metabolic status (4).

Hepatic metabolic functions are compromised, liver cirrhosis patients resulting in a variety of nutritional problems such as protein-energy-malnutrition (PEM) that is found in 65 to 90 percent of cases but is often underestimated (15). Malnutrition is a challenge in clinical practice for hospitalized patients with a variety of medical illnesses, not just those with liver cirrhosis. According to the current Global Leadership Initiative on Malnutrition (GLIM) criteria, all hospitalized patients should be examined using approved screening tools such as the Nutritional Risk Screening-2002 (NRS-2002) (16) or the Mini Nutritional Assessment-Short Form (MNA-SF)(17). These screening tools, however, do not look at fluid accumulation or and the severity of the disease (8). Hence, current screening tools might not be accurate in determining nutritional status of the patients with liver disease. Presence of fluid overload such as ascites and oedema, will be challenging in screening for malnutrition among individuals with liver disease. Besides, ascites-related intra-abdominal pressure is linked to nausea, vomiting, and early satiety. As a result, all patients with liver illness should be evaluated for screening the risk of malnutrition by using the Royal Free Hospital Nutritional Prioritizing Tool (RFH-NPT) which was suggested as a nutrition screening tool for liver illness (3).

As to date, no other study has been conducted in Malaysia with this primary focus on validating RFH-NPT. The goal of this study is to evaluate the RFH-NPT nutrition screening tools in patients with chronic liver disease, as well as to assess the relationship between NRS 2002, RFH-NPT, and the Subjective Global Assessment (SGA). This study will also determine the sensitivity, specificity and reliability of RFH-NPT. Given the elevated prevalence of malnutrition in patients with

liver disease, it was necessary to introduce a nutrition screening tool specifically tailored to these patients. RFH-NPT is the first and reliable screening tool to detect malnutrition in this population. Therefore, using RFH-NPT as a routine nutrition screening protocol in the hepatology department is extremely effective in identifying patients at risk of malnutrition and those who require early dietary intervention to avert further difficulties.

MATERIALS AND METHODS

This study was a descriptive cross-sectional design conducted in 3 phases consisting of transcultural adaptation, criterion validity and reliability in patients with chronic liver disease. This study was commenced between January 2019 to January 2021, 2 years to complete the data collection phase. The study was done at the Department of Hepatology, Selayang Hospital (Selangor), which is Malaysia's national tertiary referral center for liver disease. Prior to the start of recruitment, the Malaysian Medical Research Ethics Committee (MREC) - NMRR-19-1659-47627, authorized this procedure. The research was conducted after receiving written informed consent in accordance with the principles of the Declaration of Helsinki.

The target population for this study consisted of healthcare professionals in the hepatology department, including nurses and doctors for phase 1 (face validity), while the target population for phase 2 (criterion validity) consisted of patients with chronic liver disease admitted to the Hepatology Department of Selayang Hospital. Chronic liver disease patients who were at least 18 years old, alert and able to communicate, diagnosed with liver disease for at least 6 months, and willing to participate in this study were included. People under 18 years of age who were in an acute state, had neurological problems/ disorders, had dementia or were reluctant to participate in this study were excluded.

The calculated sample size using Beaton et al recommendation (18) for calculating face validity. The estimated sample size was 40 samples. For criterion validity, the sample size was estimated based on a rule of thumb that 10 subjects per item question is appropriate (19). The estimated sample size for this phase was 80 samples.

Phase 1 focused on the translation adaptation process and the pre-testing of the new screening tools. Translation, back-translation, expert committee assessment, and face validity testing were all part of the adaption process (pre-test). The expert group looked over all of the translations and came to an agreement on any differences. Four field experts were appointed from hepatology consultants and four medical officers were appointed as lay experts. Face validity is the final stage of the transcultural adaptation process. The new questionnaire was tested among the nurses. All the nurses completed the questionnaire and were then interviewed to ascertain their understanding of each questionnaire item.

During Phase 2, criterion validity was done which defined the level of agreement (kappa agreement) between measurement instruments, RFH-NPT, NRS 2002 and SGA. After written informed consent were acquired from patients, both RFH-NPT and NRS 2002 were assessed by nurses concurrently SGA assessment was performed by dietitian to the same patients within 24 hours after patient admission. Table II shows a summary of the screening elements contained in each screening instrument.

Table II: Summary of screening components used in the nutrition screening tools of RFH-NPT and NRS-2002

Screening Components	RFH-NPT	NRS-2002
Alcoholic hepatitis or tube feeding	X	
Age		X
Body Mass Index (BMI)	X	X
Dietary intake reduction	X	
Disease severity		X
Fluid overload	X	
Food intake	X	X
GI symptoms		
Mobility		
Neuropsychological problems		
Psychological stress/acute disease	X	
Weight loss	X	X

RFH- NPT distinguishes between low, moderate, and high risk individuals based on dietary history (unexplained weight loss, dietary consumption, and body mass index) and recent liver disease complications (acute hepatitis, ascites, and general fluid overload) using simple clinical questions that may be easily answered by non-specialist staff (20).

Another universal nutrition score for patients is the Nutritional Risk Screening (NRS) tool. Weight loss, loss of appetite, BMI, severity of illness, and older age are used by the NRS to distinguish between people who are at no risk of malnutrition ("no risk" group), low risk, and moderate to high risk. The role of NRS in patients with liver illness has not been examined in depth (21).

Royal Free Hospital-Nutritional Prioritizing Tool (RFH-NPT)

The RFH-NPT scores were calculated (20). The RFH-NPT nutritional risk score is divided into three categories: low (0 points), moderate (1 point), and high (2 points) nutritional risk (2-7 points). To classify a patient as high risk, the existence of acute alcoholic hepatitis or tube feeding must first be determined. In the second stage, people with ascites or oedema are distinguished from those who do not. Finally, individuals are assigned to the appropriate risk group depending on their score

(Figure 1).

Nutritional Risk Screening (NRS)

As previously stated, the NRS 2002 score was evaluated. Status of dietary (calorie intake, weight loss, and BMI) and disease severity are each given a three-point scale. Over 70 years of age earns as extra point (Figure 2). Individuals with 0 points had no risk of malnutrition, those with 1 to 2 points had a moderate risk, and those with 3 to 7 points had a moderate to high risk, according to the NRS 2002 (22).

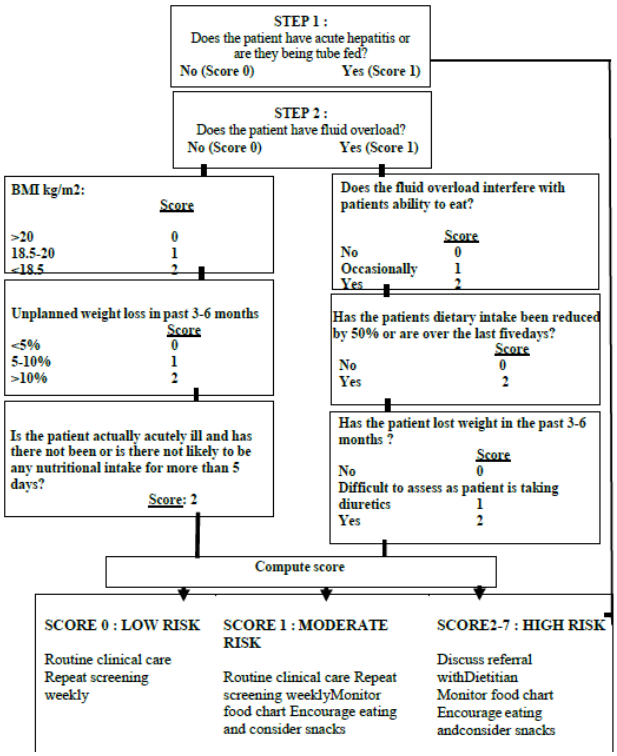


Figure 1: Royal Free Hospital-Nutrition Prioritizing Tool (RFH-NPT)

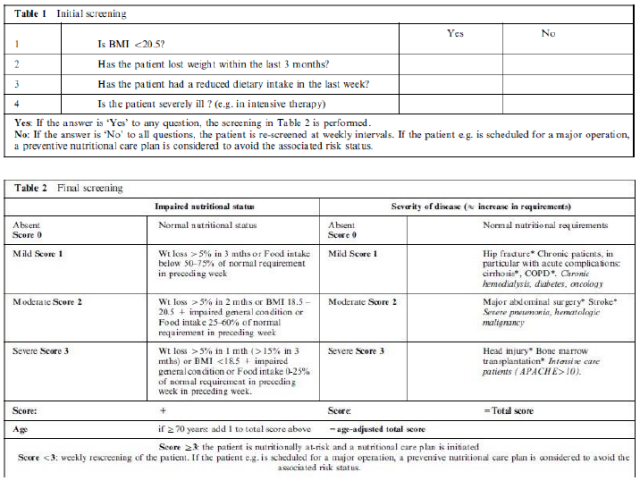


Table 1 Initial screening

		Yes	No
1	Is BMI <20.5?		
2	Has the patient lost weight within the last 3 months?		
3	Has the patient had a reduced dietary intake in the last week?		
4	Is the patient severely ill ? (e.g. in intensive therapy)		

Yes: If the answer is 'Yes' to any question, the screening in Table 2 is performed.
No: If the answer is 'No' to all questions, the patient is re-screened at weekly intervals. If the patient e.g. is scheduled for a major operation, a preventive nutritional care plan is considered to avoid the associated risk status.

Table 2 Final screening

	Impaired nutritional status		Severity of disease (= increase in requirements)
Absent **Score 0**	Normal nutritional status	Absent **Score 0**	Normal nutritional requirements
Mild **Score 1**	Wt loss >5% in 3 mths or Food intake below 50-75% of normal requirement in preceding week	Mild **Score 1**	Hip fracture* Chronic patients, in particular with acute complications: cirrhosis*, COPD*. *Chronic hemodialysis, diabetes, oncology*
Moderate **Score 2**	Wt loss >5% in 2 mths or BMI 18.5 – 20.5 + impaired general condition or Food intake 25-60% of normal requirement in preceding week	Moderate **Score 2**	Major abdominal surgery* Stroke* *Severe pneumonia, hematologic malignancy*
Severe **Score 3**	Wt loss >5% in 1 mth (>15% in 3 mths) or BMI <18.5 + impaired general condition or Food intake 0-25% of normal requirement in preceding week.	Severe **Score 3**	Head injury* Bone marrow transplantation* *Intensive care patients (APACHE>10).*
Score:	+	**Score**	**= Total score**
Age	if ≥ 70 years: add 1 to total score above	**= age-adjusted total score**	

Score ≥3: the patient is nutritionally at-risk and a nutritional care plan is initiated
Score <3: weekly rescreening of the patient. If the patient e.g. is scheduled for a major operation, a preventive nutritional care plan is considered to avoid the associated risk status.

NRS-2002 is based on an interpretation of available randomized clinical trials. *indicates that a trial directly supports the categorization of patients with that diagnosis. Diagnoses shown in italics are based on the prototypes given below. Nutritional risk is defined by the present nutritional status and risk of impairment of present status, due to increased requirements caused by stress metabolism of the clinical condition.

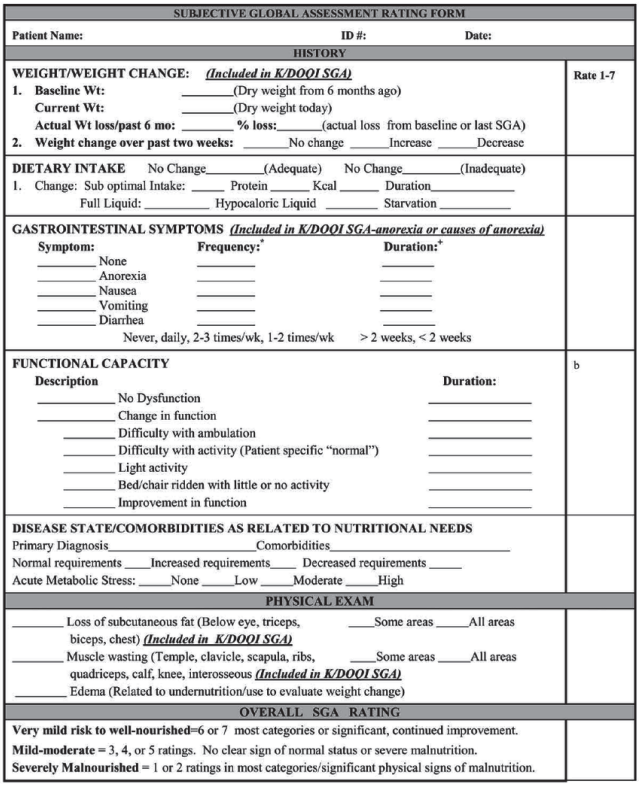
A nutritional care plan is indicated in all patients who are (1) severely undernourished (score=3), or (2) severely ill (score=3), or (3) moderately undernourished + mildly ill (score 2 +1), or (4) mildly undernourished + moderately ill (score 1 + 2).

Prototypes for severity of disease
Score=1: a patient with chronic disease, admitted to hospital due to complications. The patient is weak but out of bed regularly. Protein requirement is increased, but can be covered by oral diet or supplements in most cases.
Score=2: a patient confined to bed due to illness, e.g. following major abdominal surgery. Protein requirement is substantially increased, but can be covered, although artificial feeding is required in many cases.
Score=3: a patient in intensive care with assisted ventilation etc. Protein requirement is increased and cannot be covered even by artificial feeding. Protein breakdown and nitrogen loss can be significantly attenuated.

Figure 2: Nutritional Risk Screening (NRS 2002)

Subjective Global Assessment (SGA)

SGA (Subjective Global Assessment) is a nutrition assessment tool developed in 1982 and validated by predicting patient outcomes. The latest evidence from a randomized controlled clinical trial has shown that SGA can identify individuals who respond to a nutrition intervention (23). The five nutrition-related clinical history characteristics included in this test are reduced nutritional consumption, unintended weight loss, symptoms impacting oral intake, functional skills, and physiological demands. A physical examination is also performed, concentrating on fat loss subcutaneous, muscular atrophy, and fluid overload. Based on the SGA scoring, individuals who are well nourished (SGA A), mild to moderately malnourished (SGA B), or severely malnourished (SGA C) (Figure 3).



SUBJECTIVE GLOBAL ASSESSMENT RATING FORM

Patient Name: **ID #:** **Date:**

HISTORY

WEIGHT/WEIGHT CHANGE: ***(Included in K/DOQI SGA)*** **Rate 1-7**
1. **Baseline Wt:** _____(Dry weight from 6 months ago)
Current Wt: _____(Dry weight today)
Actual Wt loss/past 6 mo: _____ **% loss:**_____(actual loss from baseline or last SGA)
2. **Weight change over past two weeks:** _____No change _____Increase _____Decrease

DIETARY INTAKE No Change_____(Adequate) No Change_____(Inadequate)
1. Change: Sub optimal Intake: _____ Protein _____ Kcal _____ Duration_____
Full Liquid: _____ Hypocaloric Liquid _____ Starvation _____

GASTROINTESTINAL SYMPTOMS ***(Included in K/DOQI SGA-anorexia or causes of anorexia)***

Symptom:	Frequency:*	Duration:+
_____ None	_____	_____
_____ Anorexia	_____	_____
_____ Nausea	_____	_____
_____ Vomiting	_____	_____
_____ Diarrhea	_____	_____

Never, daily, 2-3 times/wk, 1-2 times/wk > 2 weeks, < 2 weeks

FUNCTIONAL CAPACITY b

Description	Duration:
_____ No Dysfunction	_____
_____ Change in function	_____
_____ Difficulty with ambulation	_____
_____ Difficulty with activity (Patient specific "normal")	_____
_____ Light activity	_____
_____ Bed/chair ridden with little or no activity	_____
_____ Improvement in function	_____

DISEASE STATE/COMORBIDITIES AS RELATED TO NUTRITIONAL NEEDS
Primary Diagnosis_____Comorbidities_____
Normal requirements ____Increased requirements____ Decreased requirements ____
Acute Metabolic Stress: ____None ____Low ____Moderate ____High

PHYSICAL EXAM
_____ Loss of subcutaneous fat (Below eye, triceps, ____Some areas ____All areas biceps, chest) ***(Included in K/DOQI SGA)***
_____ Muscle wasting (Temple, clavicle, scapula, ribs, ____Some areas ____All areas quadriceps, calf, knee, interosseous ***(Included in K/DOQI SGA)***
_____ Edema (Related to undernutrition/use to evaluate weight change)

OVERALL SGA RATING

Very mild risk to well-nourished=6 or 7 most categories or significant, continued improvement.
Mild-moderate = 3, 4, or 5 ratings. No clear sign of normal status or severe malnutrition.
Severely Malnourished = 1 or 2 ratings in most categories/significant physical signs of malnutrition.

Figure 3: Subjective Global Assessment (SGA) Form

Statistical Analysis

Statistical analysis was conducted using Statistical Package for the Social Sciences (SPSS) version 26 for Windows. Descriptive statistics were used to assess the baseline parameters. Categorical data are shown as frequencies and percentages and as for numerical data, means with standard deviations (SD) are given for normally distributed variables. The sample size was determined by feasibility, with an average annual rate of 90 cirrhotic patients being examined for malnutrition by the dietetic staff and a consent rate of 90%. All suitable patients with complete data for all two nutrition screening methods were statistically significant when $p< 0.05$ was used. The ratings for each screening tool were scaled

between 0 and 1 to normalized the data. Malnutrition cut-off values were determined using normalize cut-off values. The Pearson correlation coefficient determined the degree of correlation between test outcomes.

In addition, the researchers calculated sensitivity, specificity, positive and negative predictive values (PPV/NPV), and accuracy. Reliability of RFH-NPT interpretation was further analyzed using Kappa Cohen analysis. For RFH-NPT screening purposes, the following values were determined: sensitivity, specificity, percent positive predictive value (PPV), and percent negative predictive value (NPV): [true positives/(true positives+false negatives)]% sensitivity [true negatives/(true negatives+false positives)]; percent specificity= X100; percent positive predictive value = [true positives/(true positive+false positives)] [true negatives/(true negatives+false negatives)]; percent NPV= X100 (24). Thus, to highlight the differences between the various screening methods, Bland-Altman plots with a 95 percent limit of agreement were generated.

Anomalies, or results that go outside the agreed-upon range, have been observed (8). To test diagnostic accuracy, the region under the receiver operating curve (AUROC) was determined. To determine the predictive validity of the screening procedures, the ratio between odds ratios (ORs) and hazard ratios (HRs) was also assessed. The validation results were evaluated using published cut-off values. Good correlation received 3 points, fair correlation received 2 points, and poor correlation received 1 point for each test. Finally, the points were added together, with a greater score indicating a better validation result.

RESULTS

A total of 80 participants aged 54.0 ±8.2 years took part in this study (Table III). About 50 participants were women, while 30 participants were men. Fifty percent of the participants were of Malay ethnicity, 26 percent were of Chinese ethnicity, 19 percent were of Indian ethnicity and 5 percent were of other ethnicity. Hepatitis C and non-alcoholic liver disease (NASH) were the most usual causes of liver disease among participants, accounting for 26 and 22 percent respectively. The SGA assessment found malnutrition in 75 percent (95% CI, 65% - 80%), while RFH-NPT found 80% of patients (95% CI, 60% - 95%) were at risk of malnutrition.

The analysis showed that RFH-NPT had a significant correlation with SGA score (p=0.039, r=0.48), body mass index (BMI) (p=0.042, r=0.47) and Child Pugh Score (CPS) (p=0.048, r=0.44). The diagnostic performance of RFH-NPT was assessed using predictive measures with a high sensitivity of 97.3%, moderate specificity of 74.4% compared with SGA assessment and the positive predictive value was reported to be 88% (Table IV). The NRS 2002 had moderate sensitivity

Table III: Characteristic of participants with Chronic Liver Disease

Demographic Information	N (%)	SGA score B & C (n= 60) n(%)	SGA A (n=20) n(%)
Age, mean ±SD		54.0 ±8.2	61 ±2.4
BMI, mean ±SD, kg/m		21.4 ±12.4	31.8 ±11.2
Gender, n			
Female	50(62)	38(76)	12(24)
Male	30(37)	22(73)	8(27)
Ethnicity, n			
Malay	40(50)	30(75)	10(25)
Chinese	21(26)	15(95)	6(5)
Indian	15(19)	14(93)	1(7)
Other	4(5)	1(25)	3(75)
Cause of liver disease, n			
Hepatitis C	21(26)	18(86)	3(14)
Alcohol	15(19)	13(87)	2(13)
NASH	18(22)	14(77)	4(23)
Hepatitis C/ETOH	12(15)	8(67)	4(33)
Other	14(18)	7(50)	7(50)

Table IV: Diagnostic performance of the RFH-NPT and NRS in comparison to the SGA

Diagnostic performance analyses	RFH-NPT (%) [95% CI]	NRS (%) [95% CI]
Sensitivity	97.3 [90.7, 99.7]	82.4 [71.8, 90.3]
Specificity	74.4 [57.9, 87.0]	25.6 [13.0, 42.1]
Positive predictive value	88.0 [79.0, 94.1]	67.8 [57.1, 77.3]
Negative predictive value	93.6 [78.6, 99.2]	43.5 [23.2, 65.5]
AUC	0.95*	0.63*

RFH-NPT, Royal Free Hospital Nutrition Prioritising Tool; NRS, Nutritional Risk Screening; AUC, area under the Receiver Operating Characteristic curve; CI, confidence interval.
* This value is not a percentage.

(82.4 %) but very low specificity (25.6 %) compared with SGA assessment tool. Bland Altman was calculated based on the differences from the mean scores between SGA and RFH-NPT and NRS 2002. RFH-NPT had the best agreement when evaluating bias, SD of bias, and limits of agreement. In all comparisons, the number of outliers was modest. There were significantly strong negative correlations between SGA and RFH-NPT with a Spearman correlation coefficient of -0.74 ($p < 0.001$).

DISCUSSION

This study has never been conducted in Malaysia to determine the validity of a nutrition screening tool specifically for patients with chronic liver disease. Good screening tools should have high sensitivity, while the specificity of the instruments is acceptable to be moderate (24). In our study, the sensitivity of RFH-NPT was compared with the gold standard of SGA tool which was high and scored moderate specificity. While study from Julia Traub et al 2020 reported, the

sensitivity of RFH-NPT with NRS 2002 is low, 22% with high specificity 98%. This outcome shows that the NRS 2002 does not achieve satisfactory results for the screening for malnutrition in liver disease patients (17). The RFH- NPT has the distinction of highlighting the presence of fluid accumulation, ascites or oedema. Other causes of malnutrition included chronic liver disease complications; ascites might mechanically restrict intake of food due to increased abdominal distension; spontaneous bacterial peritonitis, which was linked with abdominal discomfort; and hepatorenal syndrome. As a result of the seriousness of this condition, these consequences may restrict food intake (25). Cirrhosis, muscle atrophy, and malnutrition have all been associated with complications and poor survival rates (26).

Nutrition screening, according to ASPEN, is a method for identifying people who are malnourished or at nutritional risk and referring them to a full nutritional diagnosis and treatment, as needed (6). Furthermore, routine nutrition screening is not widespread, although it is suggested for those at high-risk. As a result, individuals at risk of malnutrition are frequently ignored until they become malnourished and/or have a significant health episode that necessitates attention. Thus, this negligence has further economic implications and worsens quality of life (13) and this potentially changeable condition is critical for identifying malnourished patients and initiating nutritional therapy. All patients should, ideally, go through a quick nutritional test to see if they are at potential of malnutrition. A more complete nutritional examination should be undertaken on patients at risk to confirm the existence and severity of malnutrition (17). Considering the lack of a validated 'rapid' screening tool, varying definitions of malnutrition, and difficulty analyzing body composition and research lab results in the presence of fluid overload and liver dysfunction, nutrition screening and evaluation are rarely reported in patients with liver disease (4,7). According to ESPEN, screening should be a straightforward and rapid procedure performed by admissions personnel or community health professionals. A good screening tool is one that can be used by novice health practitioners (or even the patient) and has sufficient sensitivity and specificity (12). The RFH-NPT takes only 3 minutes per patients to assess those who at the risk of malnutrition. Most of the health care team involved in this study agreed that this tool is suitable and easy to use as a screening tool for routine use.

There is no best model for nutritional risk assessment, particularly in patients with liver illness, making it challenging to choose a nutritional screening instrument as a reference method for RFH-NPT validation. One of the tools used for comparison is the NRS 2002, but this does not detect the presence of subclinical fluid overload (oedema or ascites), which is another important component to determine malnutrition in patients with liver disease (15). Fluid accumulation, also known as ascites or oedema, is usually associated with liver disease, particularly cirrhosis. Portal hypertension can cause ascites, which is a common symptom. Fluid accumulation leads to a falsely higher body weight, which the dietitian must take into account. For example, if a person has oedema in the knees but states that their weight has remained the same, it is likely that they have lost body mass. Additionally, oedema and ascites can in rare cases be signs of malnutrition, especially if there is significant hypoalbuminemia (23).

The SGA is another gold standard for assessing the nutritional status of people with liver failure (9). Although the SGA is a valid and reliable tool for liver patients and has excellent intra and inter-individual reliability, the assessment can only be performed by dietitians (6). Five clinical parameters, such as weight changes in the previous 3 to 6 months, dietary, gastrointestinal issues, functional ability, metabolic disturbances, and three physical parameters, such as loss of subcutaneous fat, muscle wasting, and existence of fluid overload, are included in the SGA.

However, this study has some limitations as the completion rate by nurses was low and therefore the feasibility of using it as a routine nutrition screening tool could not be further investigated. This highlights the importance of adequate training and ongoing support for nurses to ensure compliance in the clinical setting. In addition, this tool was validated in two language versions which were English and Malay. Most experts and nurses indicated that the English version was the easiest language to complete as it is most commonly used in the clinical setting.

CONCLUSION

Given the high prevalence of malnutrition in patients with chronic liver illness, the need to introduce a nutrition screening tool specifically tailored to these patients was limited. In conclusion, the RFH-NPT is the first and most reliable screening tool that uses intake changes, weight loss, BMI, disease severity and fluid overload to detect malnutrition in this population, as it has high sensitivity in detecting patients with liver illness who are at risk of malnutrition as compared to NRS-2002. The RFH-NPT could be a useful nutritional screening tool for individuals with liver illness, but more research is needed. Therefore, it is very beneficial to integrate RFH-NPT as a routine nutrition screening protocol to the liver disease patients in direction to identify patients who are at risk of malnutrition as well as those who need immediate dietary intervention accordingly to avoid further complications.

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