Nutritional Principles in The Management of Hospitalized Patients with Liver Diseases in The Federal Medical Center, Yenagoa, Bayelsa State

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ABSTRACT

This study assessed nutritional principles in the management of hospitalized patients with liver diseases. Eight patients diagnosed of liver diseases in the period of one year were studied while on admission in the hospital using structured questionnaire to document socio-demographic, socioeconomic, health, and nutritional status.

In this cohort study, participating patients were drawn from a convenience sample. Patients were selected according to Inclusion Criteria from adult conscious patients diagnosed with liver diseases, both male and female from the male and female Medical wards (were all selected) and an Exclusion Criteria of Patients in hepatic coma, renal failure, hypertension, and diabetes (were not selected). Data collection Tools were developed and utilized to collect the data for the study, this was developed by the researcher to include patient's literacy level, occupation, marital status, income, age, sex, period of stay in the hospital, onset of disease, etiology, ascites, jaundice, severity of liver disease and BMI. The tools include: Tool I: Personal and Medical Data sheet and Tool II: Nutritional assessment sheet. The study was also conducted through, content validity by the Physicians, house officers, medical students, Corp Doctors from the medical field, nursing staff and student nurses from the nursing field.

This study finding were moderate to severe malnutrition risk prevalent among patients; malnutrition severity correlated with disease severity; and quality protein intake and vitamin/mineral supplementation can help overcome deficiencies.

It was concluded that nutritional management is vital for liver disease patients, thus, highlighting the need for tailored nutrition strategies to improve outcomes.

Key Words: Nutritional, Principles, Hospitalized Patients, Liver Diseases

INTRODUCTION

According to European Association for Study of Liver (2015) liver is a vital organ that performs hundreds of tasks related to metabolism, energy storage and waste filtering. It helps to digest food, convert it to energy and store the energy until it is needed. It also helps filter toxic substances out of the blood stream. Liver diseases cause scarring that damages to the liver and interferes with its functioning, liver diseases may develop for different reasons and can all damage the liver and affect its functions; it can lead to liver failure (European Association for Study of Liver, 2015). Cirrhosis is the result of persistent liver damage over many years; it can be caused by alcohol and drugs, viruses and metabolic factors etc. (Bouttell, Lewsey & Geue, 2016). Liver has been considered very significant in respect to nutrition. Moreover, it plays major roles in enzymatic functions in the body. Liver diseases increase pressure in the vein that brings blood to the liver, leading to swelling in the legs and abdomen. The increased pressure in the portal vein causes fluid to accumulate in the legs, leading to oedema, and in the abdomen, ascites.

Liver disease befalls all sorts of people for all sorts of reasons, while it is often associated with chronic alcohol use, it can also be contracted from some unknown conditions that are beyond the patient's control. Many people have no idea as they are suffering until they experience symptoms of severe liver conditions, but there is still hope of recovery.

Most liver diseases respond to lifestyle changes and medications, even with permanent scarring in the liver, the progress of the disease can be stopped if the damage is stopped. While some cases are more advanced than others, the physician can work out a treatment plan that will give the best possible prognosis (Carrieri, Mourad & Marcellin, 2022). Cirrhosis is a progressive condition where scar tissue gradually replaces healthy liver cells, with time; this can affect liver function and lead to symptoms like nausea, fatigue, and unintentional weight loss. Portal hypertension in liver disease patients can also be related to other complications like ascites, intrahepatic vascular resistance and oesophageal varices. Portal hypertension is defined as a pathological condition in which there is an increase in pressure gradient due to the obstruction of portal blood flow within the portal system. It is the difference in the pressure between the portal vein and hepatic vein. The prevalence of liver disease has been increased to approximately two million deaths reported worldwide.

According to Moon, Singal and Tapper, (2020), in the study on 'Contemporary Epidemiology of Chronic Liver Diseases, about 71 million patients with hepatitis C and 257 million patients with hepatitis B virus are reported as the leading causes of chronic liver disease and cirrhosis worldwide (Devarbhavi, 2023). There are many etiological factors of chronic liver diseases and liver cirrhosis which includes chronic hepatitis (B and C), steatohepatitis, alcoholic liver disease, non-alcoholic steatohepatitis (NASH) and non-alcoholic fatty liver disease (NAFLD) are common factors (Wong, Adams and Lédinghen, 2018). Malnutrition is the most prominent issue in hospitalized chronic liver disease patients. Malnutrition can occur from multiple factors such as nausea, vomiting, early satiety, constipation and liver complications (Dharmalingam & Yamasandhi, 2018). Malnutrition at the early phase of chronic liver disease may increase the disease burden, early onset of complications and increase in the length of hospital stay, morbidity and mortality. As the liver damages in case of cirrhosis liver function declines. Cirrhosis of the liver is the late stage of the disease in which healthy liver tissue have been gradually replaced with scar tissues. This is a result of a long-term chronic disease. Hepatitis is inflammation in the liver, which has many causes, when inflammation is ongoing, the liver attempts to repair itself by scarring and plenty of scar tissue in the liver reduces the liver functions, leading to the end stage of chronic liver failure (Wong, 2019).

Diagnosis of Liver Diseases

The Physician will begin by physically examining the patient for signs and symptoms of liver disease. Questions would be asked about when symptoms began and whether they have changed over time, about the patient's

medical history, what medications he/she is on, the herbs or supplements taken, the diet and lifestyle. This would be followed up with the medical tests to look for evidence of disease of the liver (Tapper & Parikh, 2023).

Laboratory Tests

Blood tests: A liver function tests can show signs of liver diseases or liver failure as the case may be. These measures liver products like liver enzymes, proteins and bilirubin levels in the blood. Blood tests may also indicate specific diseases or known side effects, like reduced blood clotting (Xu et al., 2019).

Imaging tests: Imaging tests like an abdominal ultrasound, CT (Computed Tomography) scan or MRI (Magnetic Resonance Imaging) can show the size, shape and texture of the liver. A special type of imaging test called elastography uses ultrasound or MRI technology to measure the level of stiffness or fibrosis in the liver (Xu et al., 2019). This test can also determine the amount of scarring, the amount of fat in the liver and amount of fluid in the abdomen.

Liver biopsy: A liver biopsy is a minor procedure to take a small tissue sample from the liver for test in the laboratory. Liver biopsy can help determine the cause. **Fibroscan** is also an alternative to liver biopsy.

Physical exam: The doctor will examine the patient, looking for the signs and symptoms, which includes yellowing of the skin and whites of the eyes, bruises on the skin, swelling, tenderness or pain in the abdomen, enlarged strong bumpy feeling at the lower edge of the liver (the part of the liver below the rib cage that can be felt) and enlarged spleen (Moreau, Tonon, Krag, et al., 2023).

Management and Treatment of Liver Diseases

The liver has great healing powers in general, but liver cirrhosis is a stage of disease where it does not have enough healthy cells left to heal it with, but the rate of destruction may be slowed or stopped from progressing further. This depends on causes of the liver disease, how treatable the cause is, how well the patient respond to the treatment and how it is being treated (Tan, Meng, Zeng, et al., 2019). The goals of treatment for liver cirrhosis are to slow further damage to the liver, prevent and treat symptoms, and prevent and treat complications.

Treatment of liver diseases according to Tan, Meng, Zeng, et al. (2019)

Managing the cause, if possible, to slow or reduce the damage:

a. Managing or screening for complications of disease

b. Treating the causes

c. Medications can treat certain types of liver diseases, with varying levels of success. For example, antivirals can cure chronic hepatitis C but can only suppress (not cure) chronic hepatitis B. Corticosteroids and immuno suppressants can help manage some autoimmune diseases, but not all. Other medications can reverse the effects of certain inherited diseases but may only treat the symptoms of others (Arroyo, Moreau, Jalan, 2020).

d. If the patient has toxic or alcohol-related liver disease, eliminating those toxins from the system is the only treatment. To manage this, some patient need treatment for substance use disorder, patient should stop drinking alcohol and consult the physician.

e. If the patient has non-alcohol-related liver disease, managing metabolic factors like cholesterol, blood sugar and overweight can help relieve it. Some may need medications to help manage these factors. Management of non-alcoholic fatty liver disease includes losing weight, following a healthy diet, getting physical exercise and following instructions for managing diabetes, if any (Chen, 2024).

f. There should be treatment of complications like Hepatic Encephalopathy, Ascites and Liver Tumors.

g. Dietary management of liver disease.

Liver Diseases and Nutrition

Nutrient deficiency in liver disease patients is possibly due to inadequate oral intake, restricted diet, altered taste, gastrointestinal problems and others. Micronutrient Supplementation of patients is recommended, though, there is need to conduct clinical trials to identify the efficiency of vitamin D supplementation on clinical outcomes of the patients (Manns & Maasoumy, 2022).

Inadequate oral food intake in liver disease patients is the key factor to the cause of malnutrition; the diseased patients are unable to take adequate calories and protein rich foods resulting in deteriorated nutritional status. Studies stated different methods to increase oral intake of liver disease patients is to hospitalize them, while their meals are monitored, smaller meals with increased frequency, improvement in the meal, mealtime without any interruption, with nutrition education to prevent and reverse the degree of malnutrition in patients, improving dietary intake are crucial factor to adopt (Falade-Nwulia, 2017).

Hospitalized liver disease patients who are unable to take adequate nutrition related to other complications should be shifted towards enteral nutritional support. Routes can be varying in patients according to the patient's conditions that would be either nasogastric feeding, nasojejunal feeding (McClave, DiBaise, Mullin, et al., 2016). Patients on enteral nutrition should be monitored appropriately to avoid complications. In critically ill patients, enteral nutrition is initiated with 10–20 ml per hour with critical monitoring of gastrointestinal symptoms. The energy and protein supply of patients will be planned with lower levels to prevent feeding intolerance (Blaser, Starkopf, Alhazzani, et al., 2017). In liver disease patients, key objective of nutritional management is the prevention of malnutrition and maintain good nutritional status in patients, for this purpose, adequate energy and protein intake should be prioritized. Energy expenditure can be calculated according to the Doctor's prescription. Sources of protein should be introduced precisely to the patients according to the condition of patients. Protein sources can vary from animal sources to plant sources to prevent further complications.

Nutritional assessment

To address malnutrition, early nutrition screening within 24 to 48 hours of hospitalization is needed for the patients. Malnutrition is closely linked with increased chances of morbidity and mortality in these patients that may be explained as loss in muscle mass and strength of skeletal muscles as well as reduced subcutaneous and visceral fats (Calmet, Martin & Pearlman, 2019), this may be present in 5% to 99% of the patients with liver disease and also depends on the tools that are being used for assessment. Complete nutritional assessment comprises of anthropometric measurements, biochemical data, clinical assessment and dietary evaluation. Assessment of all these parameters helps to provide adequate nutrition information of the patient to prevent malnutrition (Molfino, Johnson & Medici, 2017).

Anthropometric measurements in liver disease patients are a controversial issue due to oedema and ascites in some of the patients. Body mass index that would be calculated by using dry weight of the patients can be a quick method for patient's nutritional assessment, whereas, to get that complete picture of nutritional assessment, the methods and the limitations of assessment should be considered (Anand, 2017). Dry weight measurement for a patient, is their ideal weight without excess fluid, achieved after treatment when they are normally hydrated. Sarcopenia (a most important criterion for the detection of malnutrition) is very common in patients with liver cirrhosis; it is a progressive loss of function, strength and skeletal muscles. Sarcopenia is characterized by loss of skeletal mass and strength related to the progression of the disease. In chronic liver disease and cirrhosis, sarcopenia is common as it reflects malnourishment in patients that further linked with altered cardiopulmonary performance, quality of life, increase morbidity, and mortality (Hsu & Kao, 2018).

There is malnutrition in these patients, and patient need to undergo nutrition assessment, however, particular attention is made to patients with a BMI of less than 18.5 or with severe cirrhosis, as these patients are at highest risk of malnutrition, frailty, and sarcopenia (Tandon, Raman, Mourtzakis et al., 2017). The score is based on several factors, including fluid overload, BMI, recent weight loss and decreased oral intake. Patients are then categorized as being at low, moderate, or high risk for malnutrition. Of note, patients with acute alcoholic

hepatitis or who are receiving enteral tube feeding are automatically considered high risk (Borhofen, Gerner & Lehmann, 2016).

METHODS

Research Design: Cohort study design was used in this study to assess nutritional principles in managing hospitalized patients with liver diseases at Federal Medical Center, Yenagoa, Bayelsa State.

Procedures: The study was approved by the Health Research Ethical Committee of Federal Medical Center, Yenagoa, Bayelsa State. The researchers presented the ethical approval to the various heads of General/Internal Medicine Department in other to gain access to admitted patients diagnosed with liver disease at the time of the study.

Study Population: Inclusion criteria – adult conscious patients (male/female) diagnosed with liver diseases and admitted to male/female medical wards. Exclusion criteria – Patients with hepatic coma, renal failure, hypertension, and diabetes.

Sampling Method: Convenience sampling of 8 patients diagnosed with liver diseases over 1 year.

Informed Consent: Eight eligible patients were approached by the researchers, the purpose of the study was explained, and the informed consent obtained. Also, patients were informed about their right to withdraw and participation status would not affect care received.

Data Collection Tools:

1. Tool I: Personal and Medical Data – socio-demographic data (age, sex, occupation, marital status, income); medical data (onset of disease etiology, ascites, jaundice, severity of liver disease).
2. Tool II: Nutritional Assessment for Patients with liver diseases – Subjective Global Assessment (SGA) was used to evaluate nutritional status based on medical history, physical examination, and anthropometric measurements; while Royal Free Hospital-Nutritional Prioritizing Tool (RFH-NPT) was used assess nutritional risk of patients with liver disease (cirrhosis) based on BMI, weight loss, and disease severity.
3. Fluid Overload: Addressing the limitation of fluid overload in BMI calculation, the study used Dry BMI (estimated by subtracting ascites and edema weight from actual body weight) and usage of Mid-Upper Arm Circumference (MUAC) which is less affected by fluid overload.

Data Collection Process: Content validity ensured by physicians, medical staff, and nursing staff; official permission obtained from Head of Internal Medicine department; and patients assured of confidentiality as names coded were not for data entry

Data Analysis: Descriptive statistics used to summarize patient data; nutritional status and disease severity analysed.

Result

Table 1: Socio Demographic characteristics of the patients

Table 1 show that 87.5% of the patients were more than 55years of age, 12.5% was less than 55years of age, 62.5% were male and 37.5% were female. Only 50% were married, 50% were divorced, separated or widowed, 37.5% had the symptoms within 2years, 25% had the symptoms within 3 to 5years and 37.5% had it for more than 5years.

Table 1: Socio Demographic characteristics of the patients (n = 8)

Variables	Frequency	%
Age (years)		
<55	1	12.5

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56-60	3	37.5
60<	4	50.0
Sex		
M	5	62.5
F	3	37.5
Marital status		
Married	4	50.0
Widower/Widow	2	25.0
Separated/Divorced	2	25.0
Number of children		
<3	1	12.5
4-5	4	50.0
>5	3	37.5
Who are you living with?		
Spouse	4	50.0
Children	2	25.0
Others	2	25.0
Onset of disease		
1 to 2 years	2	37.5
3 to 5 years	3	25.0
>5 years	3	37.5

Table 2: Socio-Economic characteristics of the patients

Table 2 shows that 62.5% of the patients were literate, while 37.5 were illiterate, 12.5% had no steady source of income, 37.5% were pensioners, and 25.0% were self-employed. About 37.5% make a monthly income of less than ₦100,000, and only 37.5% make monthly income of more than ₦150,000, most of the patients, 65.5% are involved in alcohol consumption and 25.5% engage in cigarette smoking.

Table 2: Socio-Economic characteristics of the patients

Variable	**Frequency**	**%**
Literate/Illiterate		
Literate	5	62.5
Illiterate	3	37.5

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Source of income		
No regular source of income	1	12.5
Civil servant	2	25.0
Pensioner	3	37.5
Self employed	2	25.0
Monthly income earning		
<100,000	3	37.5
100,000 to 150,000	2	25.0
>150,000	3	37.5
Alcohol consumption	5	62.5
Smoking	2	25.0
None	1	12.5

Table 3 Baseline Health Information of the patients (n=8)

Table 3 reports the baseline Health Information of the patients, it shows that most of the patients, 62.5% were hospitalised for about 5 to 6weeks, 25.5% were hospitalised for less than 4weeks, 62.5% had liver cirrhosis with complications, while 37.5% had no complications, 37.5% had severe ascites, while 12.5% had no ascites. Majority, 70% had jaundiced, while 25% had no jaundice. About 50% of the patients were obese, while 50% were overweight. Only 2 females and one male recovered and were discharged, while one female and 4 male died on admission.

Table 3 Baseline Health Information of the patients

Variables	**Total**	**%**
Hospital stay		
< 4 weeks	2	25.0
5 – 6 weeks	5	62.5
> 6 weeks	1	12.5
Diagnosis		
With complications	5	63.5
Without complications	3	37.5
Other Chronic diseases		
None	1	12.5
Rheumatoid Arthritis	7	47.5

Ascites		
Non	1	12.5
Mild	2	25.0
Moderate	2	25.0
Severe	3	37.5
Jaundice		
No	2	25.0
Yes	6	75.0
BMI		
Normal	0	0
Overweight	4	50.0
Obese	4	50.0
Number of deaths	5	62.5
Number of survivals	3	37.5

Weekly follow up of hospitalized patients with liver diseases

Patient Number 01

- Female 55years Married Number of Children 5
- Literate Living with spouse Occupation Civil Servant
- Onset of illness 2 years Mid Upper Arm Circumference (MUAC) 35cm

  Height 1.64m Weight 91.5kg
- Monthly Income 120,000 Alcohol consumption Nil
- With complications Nil Jaundice Mild
- BMI Obesity class 1 Admitted from home

Diagnosis: Hepatitis

Table 4a Follow up of patient number 01

Variables	**Wk1**	**Wk 2**	**Wk 3**	**Wk 4**	**Wk 5**	**Wk 6**
Stay in Hospital 6 wks						
i. Weight	91.5kg	91.5kg	92.1kg	92.1kg	91.5kg	91.0kg
ii. MUAC	35cm	35cm	37cm	37cm	35cm	33.5cm

iii. BMI	33.8	33.8	34.1	34.1	33.8	33.7
Complications						
Ascites	Nil	Nil	300mls	200 mls	Nil	Discharged
Jaundice	Nil	Nil	Mild	Mild	Nil	Discharged
Type of feeding						
Normal	Normal	Normal	Normal	Normal	Normal	Normal

Table 4b Nutrition information Patient Number 01

Variables	Wk 1	Wk 2	Wk 3	Wk 4	Wk 5	Wk 6
Type of feed						
Carbohydrate	21 times	21 times	21 times	21 times	21 times	10 times
Protein diet	18 times	20 times	20 times	21 times	17 times	12 times
Fat rich foods	2	1	Nil	Nil	1	Nil
Fruits/Vegetables	10	12	12	10	8	7
Nasogastric feeding	Nil	Nil	Nil	Nil	Nil	Nil
Glucose drink	200 mls x 5	200 mls x 4	200 mls x 7	200 mls x 7	200 mls x 5	200 mls x 5
Casilan Formulas	200 mls x 7	200 mls x 4	200 mls x 5	200 mls x 7	200 mls x 5	200 mls x 5

Patient Number 02

- Female 62years Married Number of Children 5
- Literate Living with spouse Occupation Pensioner
- Onset of illness 2 years Mid Upper Arm Circumference (MUAC) 35cm
- Height 1.64m Weight 91.5kg
- Monthly Income 100,000 Alcohol consumption Yes
- With complications Nil Jaundice Mild
- BMI Obesity class 1 Admitted from a private clinic

Diagnosis: A**lcoholic fatty liver disease (AFLD):**

Table 5a Follow up of patient number 02

Variables	Wk1	Wk 2	Wk 3	Wk 4	Wk 5	Wk 6
Stay in Hospital 6 wks						
i. Weight	87.5kg	87.5kg	87.1kg	87.0kg	86.5kg	86.4kg

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ii. MUAC	30cm	30cm	29.8cm	28.8m	28.4cm	28.0cm
iii. BMI	33.6	33.6	33.5	33.4	33.3	33.2
Complications						
Ascites	Yes	Yes	400mls	200 mls	Nil	Discharged
Jaundice	Yes	Yes	Mild	Mild	Nil	Discharged
Type of feeding						
Normal	Normal	Normal	Normal	Normal	Normal	Normal

Table 5b Nutrition information Patient Number 02

Variables	Wk 1	Wk 2	Wk 3	Wk 4	Wk 5	Wk 6
Type of feed						
Carbohydrate	15 times	20 times	18 times	15 times	13 times	10 times
Protein diet	12 times	12 times	8 times	10 times	9 times	6 times
Fat rich foods	Nil	1	Nil	Nil	1	Nil
Fruits/Veg	8	10	9	10	7	5
Nasogastric feeding	Nil	Nil	Nil	Nil	Nil	Nil
Glucose drink	200 mls x 5	200 mls x 4	200 mls x 7	200 mls x 7	200 mls x 5	200 mls x 5
Casilan Formulas	200 mls x 7	200 mls x 4	200 mls x 5	200 mls x 7	200 mls x 5	200 mls x 5

Patient Number 03

- Male 64 years Widower Number of Children 4
- Illiterate Living with children Occupation No regular source of income
- Onset of illness 6 years Mid Upper Arm Circumference (MUAC) 30cm
- Height 1.59m Weight 89.1kg
- Monthly Income <100,000 Alcohol consumption Yes
- With complications Yes Jaundice Mild
- BMI Obesity class 11 Admitted from a private clinic
- **Diagnosis: Alcoholic Fatty Liver Disease**

Table 6a Follow up of patient number 03

Variables	Wk1	Wk 2	Wk 3	Wk 4
Stay in Hospital 4 wks				
i. Weight	89.1kg	90.0kg	Coma	RIP
ii. MUAC	30cm	30cm	29.8cm	RIP

iii. BMI	35.6	36.0	Coma	RIP
Complications				
Ascites	Yes	Yes	Coma	RIP
Jaundice	Yes	Yes	Coma	RIP
Rheumatoid Arthritis	Yes	Yes	Coma	RIP
Type of feeding				
Normal/NG Tube	Normal	NG Tube	NG Tube	RIP

Table 6b Nutrition information Patient Number 03

Variables	**Wk 1**	**Wk 2**	**Wk 3**	**Wk 4**
Type of feed				
Carbohydrate	10 times	Coma	Coma	RIP
Protein diet	12 times	Coma	Coma	RIP
Fruits/Vegetables	9	Nil	Nil	Nil
Nasogastric feeding				
Glucose drink	200 mls x 7	200 mls x 7	200 mls x 7	RIP
Complan Formulas	100 mls x 7	100 mls x 7	100 mls x 7	RIP
Pap/Milk/Sugar	150 mls x 10	200 mls x 8	200 mls x 9	RIP
Custard/Milk/Sugar	200 mls x 12	200 mls x 10	200 mls x 10	RIP
Cocoa beverage drinks	150 mls x 6	150 mls x 6	150 mls x 6	

Patient Number 04

- Male 54years Divorced Number of Children 3
- Literate Living alone Occupation self employed
- Onset of illness 2 years Mid Upper Arm Circumference (MUAC) 29cm
- Height 1.65m Weight 79.5kg
- Monthly Income >150,000 Alcohol consumption Nil
- With complications Nil Jaundice Mild
- BMI Overweight Admitted from home
- **Diagnosis: Non-Alcoholic Fatty Liver Disease**

Table 7a Follow up of patient number 04

Variables	**Wk1**	**Wk 2**	**Wk 3**	**Wk 4**	**Wk 5**
Stay in Hospital 5 wks					
i. Weight	79.5kg	79.3kg	79.1kg	79.0kg	79.0kg

ii. MUAC	29cm	28cm	27cm	26cm	25cm
iii. BMI	29.4	29.4	29.3	29.3	29.3
Complications					
Ascites	Nil	Nil	Nil	Nil	Discharged
Jaundice	Nil	Nil	Mild	Mild	Discharged
Type of feeding					
Normal	Normal	Normal	Normal	Normal	Normal

Table 7b Nutrition information Patient Number 04

Variables	**Wk 1**	**Wk 2**	**Wk 3**	**Wk 4**	**Wk 5**
Type of feed					
Carbohydrate	21 times	21 times	21 times	21 times	7 times
Protein diet	18 times	20 times	20 times	21 times	8 times
Fat rich foods	1	1	Nil	1	Nil
Fruits/Vegetables	10	12	12	10	6
Nasogastric feeding	Nil	Nil	Nil	Nil	Nil
Glucose drink	200 mls x 7	200 mls x 7	200 mls x 7	200 mls x 7	200 mls x 5
Casilan Formulas	200 mls x 6	200 mls x 6	200 mls x 6	200 mls x 7	200 mls x 5

Patient Number 05

- Female 70years Widow Number of Children 7
- Illiterate Living with children Occupation Pensioner
- Onset of illness >5 years Mid Upper Arm Circumference (MUAC) 31cm
- Height 1.63m Weight 79.3kg
- Monthly Income <100,000 Alcohol consumption Yes
- With complications yes Jaundice Severe
- BMI Overweight Admitted from the church
- **Diagnosis: Hepatitis B**

Table 8a Follow up of patient number 05

Variables	**Wk1**	**Wk 2**	**Wk 3**	**Wk 4**	**Wk 5**	**Wk 6**
Stay in Hospital 6 wks						
i. Weight	79.3kg	79.5kg	80.0kg	Coma	Coma	RIP
ii. MUAC	31cm	33cm	37cm	38cm	Coma	RIP

iii. BMI	29.4	29.4	29.6	Coma	Coma	RIP
Complications						
Ascites	Nil	Nil	600mls	500 mls	Severe	RIP
Jaundice	Mild	Moderate	Severe	Severe	Severe	RIP
Type of feeding						
Normal/NG Tube	Normal	Normal	NG Tube	NG Tube	NG Tube	RIP

Table 8b Nutrition information Patient Number 05

Variables	Wk 1	Wk 2	Wk 3	Wk 4	Wk 5	Wk 6
Type of feed						
Carbohydrate	10 times	8 Times	8 Times	Coma	Coma	RIP
Protein diet	12 times	10	10	Coma	Coma	RIP
Fruits/Vegetables	6	6	4	Nil	Nil	Nil
Nasogastric feeding						
Glucose drink	200 mls x 7	200 mls x 7	200 mls x 7	100 mls x 7	Nil	RIP
Casilan Formulas	150 mls x 8	150 mls x 8	100 mls x 8	100 mls x 6	120 mls x 5	RIP
Pap/Milk/Sugar	200 mls x 10	200 mls x 8	200 mls x 9	100 mls x 9	120 mls x 5	RIP
Cocoa beverage	200 mls x 12	200 mls x 10	200 mls x 10	100 mls x 10	120 mls x 5	

Patient Number 06

- Male 68years Separated Number of Children 2
- Illiterate Living alone Occupation self employed
- Onset of illness >5 years Mid Upper Arm Circumference (MUAC) 34cm
- Height 1.58m Weight 86.3kg
- Monthly Income <100,000 Alcohol consumption Yes
- With complications yes Jaundice Severe Smoking Yes
- BMI Obesity Class II Admitted from a traditional healer

Diagnosis: Liver Cirrhosis

Table 9a Follow up of patient number 06

Variables	Wk1	Wk 2	Wk 3
Stay in Hospital 3 wks			
i. Weight	86.3kg	Unconscious	RIP

ii. MUAC	34cm	Unconscious	RIP
iii. BMI	35	Unconscious	RIP
Complications			
Ascites	Severe	Severe	RIP
Jaundice	Severe	Severe	RIP
Type of feeding			
NG Tube	NG Tube	NG Tube	RIP

Table 9b Nutrition information Patient Number 06

Variables	Wk 1	Wk 2	Wk 3
NG Tube feeding			
Glucose drink	200 mls x 7	200 mls x 5	RIP
Custard/Milk/Sugar	200 mls x 8	200 mls x 10	RIP
Complan Formulas	100 mls x 7	100 mls x 4	RIP
Pap/Milk/Sugar	200 mls x 8	200 mls x 8	RIP
Cocoa Beverage drink	200 mls x 7	200 mls x 7	RIP

Patient Number 07

- Male 65 years Married Number of Children 6
- Literate Living with spouse Occupation Pensioner
- Onset of illness 5 years Mid Upper Arm Circumference (MUAC) 36cm
- Height 1.60m Weight 87.0kg
- Monthly Income >150,000 Alcohol consumption Yes
- With complications yes Jaundice Severe Smoking Yes
- BMI Obesity Class I Referred from the village to the hospital

Diagnosis: Cancer of the Liver

Table 10a Follow up of patient number 07

Variables	Wk1	Wk 2	Wk 3	Wk 4	Wk 5	Wk 6	Wk 7
Stay in Hospital 7 wks							
i. Weight	87.0kg	89.0kg	91.0Kg	92.1kg	Unconscious	Unconscious	RIP
ii. MUAC	36cm	37.1cm	37.8cm	38cm	Unconscious	Unconscious	RIP
iii. BMI	33.5	34.2	35	35.4	Unconscious	Unconscious	RIP

Complications							
Ascites	Moderate	Moderate	Severe	Severe	Unconscious	Unconscious	RIP
Jaundice	Moderate	Moderate	Severe	Severe	Unconscious	Unconscious	RIP
Type of feeding							
Normal/NG Tube	Normal	Normal	Normal	NG Tube	NG Tube	NG Tube	RIP

Table 10b Nutrition information Patient Number 07

Variables	Wk 1	Wk 2	Wk 3	Wk 4	Wk 5	Wk 6	Wk 7
Oral intake/NG Tube							
Carbohydrate	21 times	21 times	21 times	21 times	Coma	Coma	RIP
Protein diet	18 times	20 times	20 times	21 times	Coma	Coma	RIP
Fat rich foods	Nil	1	Nil	Nil	Coma	Coma	RIP
Fruits/Vegetables	10	12	12	10	Coma	Coma	RIP
Nasogastric feeding	Nil	Nil	Nil	Nil	Yes	Yes	RIP
Cocoa Beverage	150 mls x 5	100 mls x 4	100 mls x 7	100 mls x 7	200 mls x 8	200 mls x 5	RIP
Glucose drink	200 mls x 5	200 mls x 4	200 mls x 7	200 mls x 7	200 mls x 8	200 mls x 5	RIP
Pap/Milk/Sugar	200 mls x 10	200 mls x 8	200 mls x 9	100 mls x 9	120 mls x 8	120 mls x 8	RIP
Custard/Milk/Sugar	200 mls x 12	200 mls x 10	200 mls x 10	100 mls x 10	120 mls x 8	120 mls x 8	RIP
Casilan Formulas	200 mls x 7	200 mls x 4	200 mls x 5	100 mls x 7	100 mls x 5	100 mls x 5	RIP

Patient Number 08

- Male 59years Married Number of Children 7
- Literate Living with spouse Occupation Civil Servant
- Onset of illness 4 years Mid Upper Arm Circumference (MUAC) 30cm
- Height 1.57m Weight 74.8kg
- Monthly Income >150,000 Alcohol consumption Yes
- With complications yes Jaundice Moderate
- BMI Obesity Class I Admitted from home

Diagnosis: Liver Cirrhosis

Table 11a Follow up of patient number 08

Variables	Wk1	Wk 2	Wk 3	Wk 4	Wk 5
Stay in Hospital 5 wks					
i. Weight	74.8kg	75.0kg	Coma	Coma	RIP

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ii. MUAC	30cm	32.1cm	Unconscious	Unconscious	RIP
iii. BMI	29.92	30.0	Unconscious	Unconscious	RIP
Complications					
Ascites	Mild	Moderate	Unconscious	Unconscious	RIP
Jaundice	Mild	Moderate	Unconscious	Unconscious	RIP
Type of feeding					
Normal/NG Tube	Normal	Normal	NG Tube	NG Tube	RIP

Table 11b Nutrition information Patient Number 08

Variables	Wk 1	Wk 2	Wk 3	Wk 4	Wk 5
Type of feed					
Carbohydrate	21 times	1 times	Coma	Coma	RIP
Protein diet	20 times	21 times	Coma	Coma	RIP
Fat rich foods	Nil	Nil	Coma	Coma	RIP
Fruits/Vegetables	12	10	Coma	Coma	RIP
Nasogastric feeding	Nil	Nil	Yes	Yes	RIP
Glucose drink	200 mls x 7	200 mls x 7	200 mls x 8	200 mls x 5	RIP
Complan Formula	200 mls x 9	100 mls x 9	120 mls x 8	120 mls x 8	RIP
Pap/Milk/Sugar	200 mls x 10	100 mls x 10	120 mls x 8	120 mls x 8	RIP
Cocoa beverage	200 mls x 7	200 mls x 7	200 mls x 8	200 mls x 5	RIP
Custard/Milk/Sugar	200 mls x 5	200 mls x 7	200 mls x 5	200 mls x 5	RIP

DOCUMENTATION

1 The focus on documentation of patient's care in the hospital file includes:

a. Level of activity of patient

b. Cause and precipitating factors of the illness

c. Plan of care

d. Response to interventions and treatment (improving or deteriorating)

e. Changes to plan of care

f. Attainment or progress toward desired outcome

g. Caloric intake

h. Duration of the problem

Discharge of the patients

On discharge dietary education and instructions given to the patient

a. Dietary instructions were given to the discharged patients

b. Exclusion of alcohol in their lifestyle

c. Continue on salt restriction

d. Avoidance of stress

e. Written instructions were given to the patients on counselling and reinforcement to patient and family support

f. Adequate rest was encouraged and change in lifestyle (adequate diet, elimination of alcohol and adequate rest)

g. Patient to provide positive feedback to the hospital on the outcome

DISCUSSION

The findings of this study demonstrated that nutritional assessment and nutritional management is very important for treating patients with liver diseases, as malnutrition is common among these patients, early detection of this disease could reduce the severity (Putadechakum, Klangjareonchai & Soponsaritsuk, 2012). In some developed hospitals with severe cases and complications, enteral and parenteral nutrition are used side by side for the treatment of the cirrhotic patients to maintain their nutritional status and to prevent the body from the severity of the disease which prolong patients' lives and maintain the level of nutrients in the body, but in this study, only oral and enteral nutrition procedures were implemented on the patients. Oral nutrition is the normal way of feeding while enteral nutrition is an effective way of providing nutrients to the patients' bodies that are unable to meet nutrient needs through Naso Gastric Tube Feeding and it is mostly used in patients whose gastrointestinal functions are adequate and can metabolize the nutrients provided (Teiusanu, Andrei, & Arbanas, 2012). It is cost-effective, well tolerated and has few complications to improves patients' quality of health. In enteral tube feeding the use of nutrient dense formulas in different forms were fed the patients to meet their nutritional needs of food nutrients like carbohydrate, protein, fat, vitamins, minerals, water. Some nutritionally rich formulas were also given to the patients to prevent hypo and hyperglycaemia. The use of supplemental formulas depends on the patients' body requirements, severity of disease and tolerance (Teiusanu, et al., 2012).

In this study the prevalence of ascites and oedema, were higher in the patients with complications. The ratio of liver disease appeared more in males than in females as it is thought that women consume less alcohol and cigarettes than men. Likewise, a cross-sectional study conducted by Baig (2009), on Gender disparity in infections of Hepatitis B virus, on 472 patients with hepatitis infection. The hepatic infection was 79.5% in males and 20.5% in females with a ratio of 4:1 due to a high rate of alcohol and cigarette consumption. It also showed that in women, estrogen gives protection and acts as a defender in the body against human immunodeficiency virus or other progressions towards hepatic diseases. There was another study, involving 67% males and 33% females, conducted by Almani, Memon, Memon, et al. (2008) in Liaquat University Hospital, Hyderabad, Pakistan, from April 2005 to April 2007. Among the majority of patients, 52% had Hepatitis C Virus infection, 16% had hepatitis B virus (HBV) infection and 16% had Hepatitis B Virus and Hepatitis C Virus co-infection, about 60% were smokers, 10% had alcohol abuse and 12% had primary biliary cirrhosis (Almani, et al., 2008). Based on the results of this study, majority of the patients were males in middle adulthood and this was the findings supported by Abdel Ghaffar, (2004) who reported that the percentage of liver disease is higher among male patients than in female patients in Egypt and that liver disease is as twice as common in men than in women and prevalent among malnourished patients over age 50 years of age.

The patient's socio-demographic information in this study was also associated with severity of the disease. The results of the current study of Sallam (2007) observed that, about more than half of the study patients were illiterates, this would be attributed to the fact that the majority of the study patients were residing in rural areas. These finding is consistent with the poor conditions of the illiterate patients in this study. Most of the patients had low income, some were retired or unemployed, most were above 60 years of age and were physically in a vulnerable state to earn their living, and some were widowed, divorced or separated. The same results were observed by Jepsen, Vilstrup, and Andersen (2009) in the study on 'Socioeconomic status and survival of liver disease patients: A Danish nationwide cohort study' who found that the rate of survival in cirrhotic patients were associated with employment level and marital status. The incidence of overweight, obesity and hypo or hyperglycaemia with BMI (29 and above) in this study were more in-patients with complications, with uncertain state of excess adipose tissues, muscle wasting and loss of lean body mass due to the oedema and ascites. The relationship of obesity, nutritional status and muscle wasting in patients assessed for liver transplantation, in a study by Vidot, Kline, Cheng, (2019) showed the same results in 205 patients in which muscle wasting was identified in 86% of patients linked with hepatic encephalopathy because of malnutrition and inadequate daily caloric and nutrient intake.

The activities and functional complications were also found among the patients and the functional problem were noticed in studies conducted on hospitalized cirrhotic patients by Japan's Ministry of Health, Labor and Welfare surveyed 294 liver disease patients between 2007 and 2011, participants comprised of 171 males and 123 females, about 61% showed obesity with ascites, oedema, jaundice and functional inactivity in hepatitis C (Shiraki, Nishiguchi, Saito, 2013). According to Vasques, Guerreiro, and Sousa (2019) to prevent sarcopenia in liver disease patients, an estimate of about 1.5g/kg/day with 30–40 kcal/kg/day with at least 50g of carbohydrate should be provided, energy intake should be reduced to (25 kcal/kg/day) in patients complicated with Diabetes Mellitus, the results of the Sanchez and Aranda-Michel (2006) showed that patients on the enteral support were almost having the recommended calories (2000 kcal), carbohydrate (350 g), protein (84 g) and fat (66 g).

In a study by Campillo, Richardet, and Scherman, (2003) on the 'Evaluation of nutritional practice in hospitalized liver disease patients: Results of a prospective study, (2003) also showed that the patients on enteral nutrition have good nutritional status, quality of life, metabolic demand and better survival rate. The synthesis and degradation rates of albumin in these patients are decreased compared with those in healthy individuals with normal liver functions. A combination of serum albumin concentration, level of ascites, oedema and hepatic encephalopathy is used to assess the nutritional status and rate of malnutrition in these patients (Gunsar, Raimondo, & Jones, (2006). It was observed in this study that there were challenges that hindered the nutritional management of the patients, some of which include - insufficient time and facilities to perform nutritional status assessment and adequate plan for nutritional interventions, lack of local nutritional guidelines, difficulty adhering to nutritional advice and lack of monitoring of dietary intake. It was evident that the hospital professionals identified the importance and necessity of nutritional management of liver diseases from their responses, however, lack of awareness of human resources and funding challenges were also observed as reasons why nutritional assessment, referral to nutritionist/dietician, adequate plan and implementation of the nutrition interventions were not routinely performed (World Health Organisation, 2010).

Complications of the disease and the prognosis of the patients depend on the degree of liver insufficiency and if the treatment is implemented early enough to guarantee a normal life (Smeltzer & Bare, 2004). In this study, 62.5% of the patients were lost to death, while 37.5% recovered and were discharged home, hence, when the signs of impending or advancing coma were observed in the patients, the amount of protein in their diet were reduced temporarily and a high-calorie intake maintained with supplemental vitamins and minerals provided.

CONCLUSION

This study tried to identify some previously unknown understanding of the impact of the nutritional needs in patients with liver diseases, it must be noted that the nutritional management of the disease is vital to meet patients' recovery needs and to develop appropriate patient education strategies, it also involves patients to participate in their care and treatment and ensuring understanding to strengthen their self-management and have the necessary knowledge to manage the disease in their everyday lifestyle. Even if the liver disease is from other factors, eliminating alcohol and tobacco from their lifestyle will help preserve the liver longer (Tandon et

al., 2017). The Nutritionist/Dietician can recommend that anyone with any type of liver disease should try to maintain, eat protein and carbohydrate rich foods and achieve a healthy weight. Some patients might need dietary supplements to treat nutritional deficiencies (Tandon et al., 2017).

Malnutrition is exceptionally prevalent among liver disease patients, regardless of the causes and severity, it is important to screen all patients to identify their level of malnutrition. Precise and accurate assessment of nutritional status is the top priority so that proper nutrition intervention can be planned and implemented to prevent complications of the disease. Intake of quality protein and adequate vitamin and mineral supplementation can help overcome deficiencies and complications associated with the end-stage liver failure. Most of the patients in this study had moderate to severe risk of malnutrition, the degree of malnutrition is parallel with the severity of the disease among the patients. Hence, the report from this study can be used as practical means for identifying malnutrition among liver disease patients in routine clinical practice.

LIMITATIONS

There were limitations experienced in this study, which includes

The interviews were performed in the hospital and the environment was not convenient for the patients to express themselves

The patients were interviewed right after they were admitted, though, more preparation time must have been established to enable them to recall and reflect more on their experiences

Some of the patients were transferred from one department to the other, which have brought about variations in their data

This study is a small sample size, more patients could have been studied, but for my limited one year study

Additionally, purposive sampling was used to select participants, which may have created some selection bias

Strength

One of the strengths in this study is the hospitalization of the patients, they were always available for the study

The detailed description of the study aim, participating patients, data collection and analysis enabled the researcher to conduct the study

Presence and responsibilities of other medical team members with varying professional backgrounds and years of experience, as well as patients with varying stages of the disease were enough with the variables needed for the study

RECOMMENDATIONS

Based on the findings of this study, the following recommendations were derived

Nutritional assessment forms or sheet should be provided for patients care in the hospitals

There should be nutritional counselling sessions for all patients with liver diseases in the hospital

Replication of the study on large number of patients with liver diseases from different hospitals and backgrounds should be done by other researchers

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