Nutritional Status Trajectory in Decompensated Chronic Liver Disease: A Prospective Survey of Pre- and Post-Hospitalization Changes Using Comprehensive Anthropometric, Biochemical, Clinical, Dietary and Handgrip Strength Assessments

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Abstract
Malnutrition in decompensated chronic liver disease leads to hepatic encephalopathy, sepsis and sarcopenia, and remains a key predictor of poor survival. This study evaluates and compares the overall health status of DCLD patients pre- and post-hospitalization following medical treatment and dietary modification. Nutritional status was assessed using anthropometric, biochemical, clinical, dietary and handgrip strength assessments. A total sample of 10 patients (n=10) diagnosed with DCLD were placed on a salt-restricted high-protein diet with oral nutritional supplements (ONS) and late evening snacks. Post-hospitalization assessment reveals 60% nutritional improvement witnessed with reduced ascites, improved intake, enhanced handgrip strength, and significant electrolyte balance. Lower serum albumin levels in all samples indicate poor baseline health status, which is associated with ascites. Hyponatremia and hypoalbuminemia were noted in 80% of samples at admission, and changes in hyponatremia were noted in 60% of samples as sodium values improved at the time of discharge, with resolution observed in 20% of samples. Dietary assessment shows 60% of samples achieved the actual nutrition requirement while the remaining 40% had inadequate intake due to disease severity. Handgrip strength was monitored at the first and last day of hospitalization. As the hospital stay ranged from 4 to 7 days, improvement in handgrip strength was gradually noted in 70% of samples, while the remaining were unchanged. This proves that right diagnosis with proper therapeutic nutritional care helps in optimizing health status.

Keywords: Decompensated Chronic Liver Disease, Nutrition Assessment, Handgrip Strength, Malnutrition

Introduction

Chronic liver disease, particularly in its decompensated phase, indicates a profound metabolic crisis where the functions of the liver falter, and

nutritional status deviation transforms single organ failure into a multisystem threat. Decompensated chronic liver disease patients with poor nourishment are led to recurrent ascites, encephalopathy, esophageal varices, variceal hemorrhage or jaundice, and insufficiency of the liver pushes them toward protein energy malnutrition with sarcopenia, deficiencies of micro-nutrients, and a hypermetabolic state that demands recurrent hospitalization and simultaneously decreases the survival rate of patients. Up to 80% of DCLD patients are reported with severe malnutrition on hospital admission, which leads to complications like sepsis, prolonged intensive care requirement, and beyond 50% mortality rates within a year, even when front-line treatment with nutritional care was provided [1].

DCLD diminishes oral intake by causing nausea and anorexia, and at its severity also leads to malabsorption. Infection results in a hypercatabolic state due to inflammation and insulin resistance, which altogether results in skeletal muscle wasting and a hypermetabolic state that can be assessed through handgrip strength assessment using handgrip strength metrics. Hospitalization may accelerate the severity as hospital procedures require fasting supported only by intravenous fluids to balance and maintain electrolytes; prolonged hospitalization may also lead to nosocomial stressors, and discharge after further treatments demands readmission cycles that strain the healthcare system. European and American research reveals that malnourishment in DCLD patients results in 1.5–2 fold higher mortality even when tailored treatment and nutritional care were provided during hospitalization [2].

Guidelines from ESPEN and EASL urge early comprehensive screening and nutritional assessment of DCLD patients through anthropometry, analysis of biochemical parameters such as albumin, SGOT, SGPT, clinical assessment, 24-hour or 3-day diet history, and other dietary audits. Handgrip strength assessment helps in capturing the prevalence of malnutrition in nearly 50–90% of patients, but it is frequently neglected in both pre- and post-hospitalization periods. Longitudinal surveys with prospective data on analysing the nutritional status at the time of admission, particularly including handgrip assessment, help in identifying malnutrition at an earlier stage [3]. This survey addresses the meticulous tracking of nutritional status in decompensated chronic liver disease through pre- and post-hospitalization assessment of anthropometry, biochemical panels, clinical grading, calculation of therapeutic diet intake, and handgrip strength assessment. This helps in identifying the predictors of malnutrition in DCLD patients and empowers dietitians and hepatologists for optimising precision nutritional and treatment care [3].

Materials and Method

Selection of area: Samples were inpatients of the gastroenterology ward in a multispeciality hospital in Coimbatore.

Selection of samples: Ten patients with DCLD were selected as samples through purposive sampling methods. Late adulthood samples were selected for the study irrespective of gender.

Selection of tools: Detailed data of anthropometric assessment, biochemical data, clinical sign data, 24-hour diet history for calorie and protein calculation, handgrip strength data, and calorie and protein intake at the time of hospitalization were recorded individually for all samples manually. The t-test was used for statistical analysis of the data.

Anthropometric assessment: Height and weight of all 10 samples were collected and BMI was calculated. Since 6 samples had ascites, dry weight was used to calculate BMI; for the remaining 4 samples, actual body weight was used. This data was also recollected at the time of discharge.

Biochemical assessment: Biochemical tests such as serum bilirubin, SGPT, SGOT, ALP, and serum albumin values from liver function tests were collected for analysis.

Clinical assessment: Clinical signs such as the presence of edema, ascites, pedal edema, and presence of esophageal varices in the abdomen were noted at both the time of admission and discharge.

Dietary assessment: A 24-hour recall was used to calculate the calorie and protein intake of samples, and during hospitalization the daily diet intake was recorded to compare and analyse the result.

Handgrip strength assessment: A handgrip dynamometer was used to record the handgrip strength of samples. Handgrip strength assessment was performed at the time of admission and again at discharge.

Results

The anthropometric, biochemical, clinical, and dietary data were analyzed and compared with initial and final assessment data. Analyzing the body mass index of the samples, 20% were overweight, 40% were Grade 1 obese, and 40% were Grade 2 obese. In weight calculation, dry weight was used for samples with as cites (n=6) and actual body weight was used for the remaining samples.

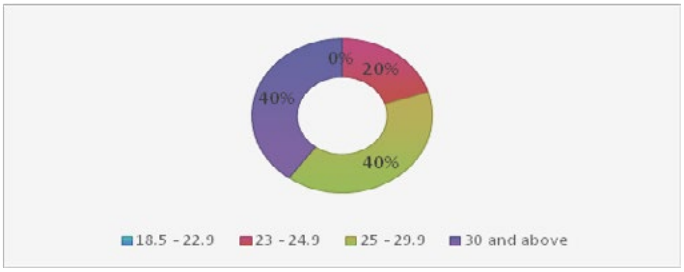

Figure 1 BMI Comparison of Samples

On comparing the weight of the samples, weight reduction was analyzed in 60% of samples as ascites were reduced at the time of discharge due to diuretics, tapping, and a salt-restricted high-protein diet with fluid restriction of less than 1.5 litres per day.

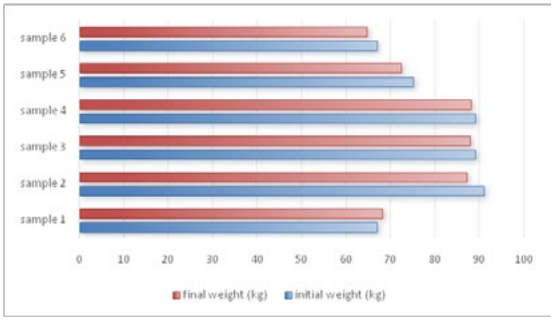

Figure 2 Pre- and Post-hospitalization Changes in Weight

On analyzing the biochemical assessment of samples, serum albumin was found deficient in all samples, directly indicating poor health status. Hyponatremia and hypoalbuminemia were noted in 80% of samples (n=8). Although changes in serum albumin cannot be noted within a short-term hospital stay as visible changes require 15 days, changes in hyponatremia were noted in 60% of samples as sodium values improved at the time of discharge. The standard biomarkers of decompensated chronic liver disease, namely SGPT and SGOT, which indicate active inflammation or damage of liver cells, remained elevated in 90% of samples (n=9). Elevated ALP (alkaline phosphatase), which indicates impairment of bile flow, destruction of bile ducts, or scarring of bile ducts, was also noted in 60% of samples.

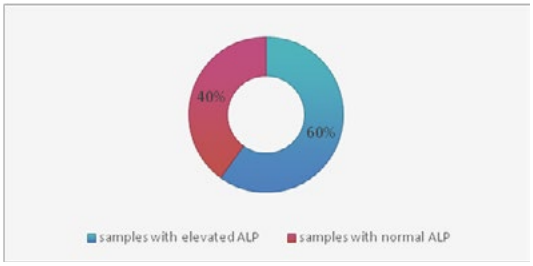

Figure 3 Alkaline Phosphatase Values in Samples.

A salt-restricted high-protein diet with late evening snacks and fluid restriction of 1.5 litres per day was commonly provided for all samples, aiming to achieve 1,800–2,000 kcals per day with 80–90 grams of protein per day. Though the same dietary pattern was followed for all samples, the intake of each sample varied with the intensity of current illness, personal likes and dislikes, and calorie and protein achieved during the hospital stay differed with each sample. On comparing all sample data, 60% of samples achieved the actual nutrition requirement, while the remaining 40% had improper intake due to the severity of current illness. Though late evening snack is important, it proved challenging for all patients in terms of consumption. The average calorie and protein achieved during the hospital stay was comparatively higher than the pre-hospitalization 24-hour recall, as intake had been reduced due to current illness.

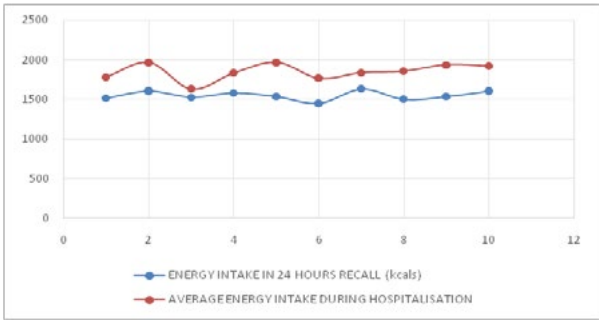

Figure 5 Comparison of Energy Intake Pre-Hospitalization and During Hospital Stay

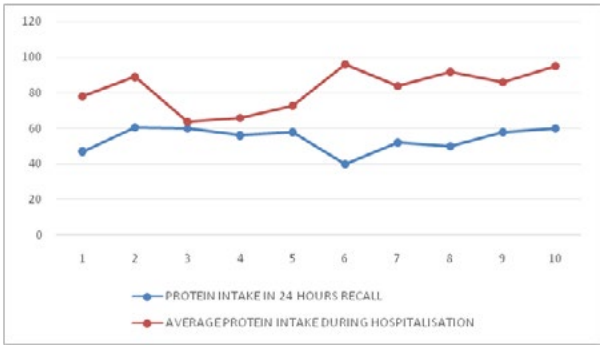

Figure 6 Comparison of Protein Intake Pre-hospitalization and During Hospital Stay

Handgrip strength was monitored at the first day of assessment and reassessment was done at the time of discharge. As the duration of hospitalization ranged from 4 to 10 days, improvement in handgrip strength was gradually found in 60% of samples (n=7), while the remaining samples remained unchanged.

Conclusion

Decompensated chronic liver disease requires proper multidisciplinary support for management. Correct dietary modification helps in reducing the current illness, reduces the length of hospital stay, and also helps in reducing recurrent hospital admissions. Fluid restriction with salt restriction and higher protein intake supports recovery from current illness and management of symptoms. The handgrip strength assessment plays a major role in identifying and analysing short-term health changes. Proper screening and tailored nutritional care significantly reduce the duration of hospitalization and also help in reducing recurrent admission. As a future study, body composition analysis (BCA) can be done at the pre- and post-hospitalization period as a long-term study to analyse accurate health status assessment.

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