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IMPACT OF NUTRITIONAL THERAPY ON QUALITY OF LIFE IN CHRONIC LIVER DISEASE PATIENTS: A QUASI-EXPERIMENTAL STUDY

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ABSTRACT

Malnutrition is a common yet often neglected issue in patients with Chronic Liver Disease (CLD) and cirrhosis, as clinical care typically emphasizes medication and laboratory monitoring over nutritional support. The lack of dietary guidance from healthcare providers contributes to poor health outcomes and a diminished quality of life. This study evaluated the impact of dietary advice on nutritional status, liver function, and quality of life in CLD patients. A quasi-experimental study was conducted at CMH Lahore, involving 56 patients divided into two groups of 28. Group A received standard medical care, while Group B received dietary advice in addition to routine treatment. Assessments at baseline and after three months included anthropometric measurements, serum albumin levels, calorie intake, and Chronic Liver Disease Questionnaire (CLDQ) scores. Results showed that Group B patients had significantly improved outcomes at follow-up, including higher body mass index (20.2 vs. 23.4), tricep skinfold thickness (1.3 vs. 1.9), mid-upper arm circumference (24.3 vs. 27.8), and mid-arm muscle circumference (10.4 vs. 23.6) compared to Group A. Significant improvements were also observed in CLDQ domains such as abdominal symptoms, fatigue, systemic symptoms, and overall quality of life scores. The study concluded that dietary advice positively influences anthropometric parameters, calorie intake, liver function, and quality of life in patients with CLD

INTRODUCTION

Chronic Liver Disease (CLD) is a major public health issue due to its high morbidity and mortality rates. It is a progressive condition involving the death of hepatic cells, leading to loss of liver function and structure [1]. A large number of CLD patients develop cirrhosis, characterized by inflammation, fibrosis, and architectural distortion. Alcohol consumption and hepatitis B and C infections are leading causes of CLD, especially in resource-limited countries like Pakistan [2].

The liver plays a crucial role in protein metabolism, producing ammonia as a by-product [3]. In CLD patients, albumin production drops significantly, resulting in hypoalbuminemia [4]. The liver also regulates glucose homeostasis and metabolizes lipoproteins and cholesterol [5]. Malnutrition is a serious concern in CLD, linked with poor prognosis and increased complications [6]. It results from reduced intake, impaired digestion, anorexia, and the body's stress response to illness [7]. As malnutrition worsens, the severity of CLD increases, deteriorating liver function.

Studies show malnourished patients have a higher prevalence of cirrhosis and its complications, including sepsis, ascites, encephalopathy, peritonitis, and hepatorenal syndrome [8]. Malnutrition is a common complication in liver cirrhosis, affecting 20%–50% of patients, and typically refers to undernutrition [9]. This study aimed to evaluate the effect of dietary advice on nutritional status, liver function (serum albumin), and quality of life in CLD patients, compared to those receiving standard care without nutritional guidance.

MATERIAL AND METHODS

This study employed a quasi-experimental design with non-random allocation of patients into two treatment arms. It was conducted at the Department of Medicine, Combined Military Hospital (CMH), Lahore. The study was carried out from January 2015 to February 2017. The sample size was calculated using the Raosoft calculator, considering a 10% margin of error and 90% confidence level. Fifty-six CLD patients aged 18–70 years with BMI >18.5 kg/m² were enrolled using non-probability consecutive sampling and divided into two groups. Group A (n=28) received standard CLD treatment, including antiviral therapy (where indicated), hepatoprotective agents, diuretics (if needed), and regular monitoring of liver function tests and complications. Group B (n=28) received the same standard care plus dietary counseling. They attended two dietary sessions guided by the Pakistan Food Composition Table (2001), targeting specific caloric and protein intake. Food diaries were maintained and reviewed by a nutritionist.
Data were collected from patients directly at two time points: at baseline (upon enrollment) and after three months. This included demographic and clinical information, obtained from both patient interviews and medical records. Anthropometric assessments were conducted by trained personnel using standard procedures: BMI was calculated using the formula weight (kg)/height (m²); mid-upper arm circumference (MUAC) and mid-arm muscle circumference (MAMC) were measured using non-stretchable tape and standardized methods. Serum albumin was analyzed in the hospital lab. Quality of life was evaluated using the validated Chronic Liver Disease Questionnaire (CLDQ), which has a high internal consistency (Cronbach's $\alpha = 0.94$) as reported by Younossi et al. (1999). The CLDQ consists of 29 items scored from 1 to 7, yielding a total score range of 29–203, with higher scores indicating better quality of life. The study followed ethical standards .Written informed consent was obtained from all participants, and confidentiality was strictly maintained with secure data storage.
Statistical analysis was performed using SPSS version 20. The Shapiro-Wilk test was applied to assess normality. Qualitative data were summarized as frequencies and percentages, while

quantitative data were presented as mean ± standard deviation. Based on distribution, parametric tests (independent and paired t-tests) were used as data was normally distributed. The chi-square or Fisher's exact test was used for categorical data. A p-value ≤ 0.05 was considered statistically significant. Within-group comparisons were performed to observe pre- and post-intervention differences.

RESULTS

Table 1 summarizes the demographic and disease characteristics of participants in Groups A and B. The average age was 55.1 years, with Group A being slightly older (56.1 vs. 54 years). Both groups had an equal gender distribution, while Group B had more participants with postgraduate education. Disease characteristics were also compared between the two groups.

Table 1: Comparison of Demographic characteristics of the study participants in two arms of the trial at baseline

Demographic Characteristics	Group A (n = 26)	Group B (n = 26)	Total (n = 52)
Age (years)	56.1 ± 5.1	54.0 ± 5.2	55.1 ± 5.2
Age Categories			
≤ 50 years	4 (15.4)	8 (30.8)	12 (23.1)
51 - 55 years	15 (57.7)	10 (38.5)	25 (48.1)
> 55 years	7 (26.9)	8 (30.8)	15 (28.8)
Gender			
Male	15 (57.7)	15 (57.7)	30 (57.7)
Female	11 (42.3)	11 (42.3)	22 (42.3)
Education			
Illiterate	8 (30.8)	6 (23.1)	14 (26.9)
Up to Matric	11 (42.3)	5 (19.2)	16 (30.8)
Masters	7 (26.9)	15 (57.7)	22 (42.3)
Antigens			
Hepatitis B Surface Antigen	7 (26.9)	6 (23.1)	13 (25)
Anti HCV	19 (73.1)	20 (76.9)	39 (75)
Child Pugh classification for Cirrhosis severity			
A (5 – 6 points)	8 (30.8)	7 (26.9)	15 (28.8)
B (7 – 9 points)	8 (30.8)	10 (38.5)	18 (34.6)
C (10 – 15 points)	10 (38.5)	9 (34.6)	19 (36.5)
Disease duration (years)			
Less than equal to five years	8 (30.8)	9 (34.6)	17 (32.7)
Greater than 5 years	18 (69.2)	17 (65.4)	35 (67.3)
Recruitment of participants			
Outpatient department (OPD)	18 (69.2)	15 (57.7)	33 (63.5)
Hospital wards	8 (30.8)	11 (42.3)	19 (36.5)

Comparison of Anthropometric measurements, serum Albumin, food record and quality of life among study participants in two arms of the trial at baseline

At baseline, Groups A and B were similar in BMI, mid-upper arm, and midarm muscle circumferences. However, Group B had higher triceps skinfold thickness (1.9 vs. 1.4), while

Group A had higher serum albumin levels (35.2 vs. 29.1). Group B also reported higher individual and average food intake. No significant differences were observed in quality-of-life domains between the groups These findings are summarized in Table 2.

Table 2: Comparison of Anthropometric measurements, serum Albumin,food record and quality of life among study participants in two arms of the trial at baseline

Anthropometric measurement	Group A (n = 26)	Group B (n = 26)	Total (n = 52)	P-value
Body Mass index (kg/m^2)	21.4 ± 3.6	22.7 ± 4.8	22.1 ± 4.2	0.257
Tricep skin fold thickness (cm)	1.4 ± 0.4	1.9 ± 0.5	1.6 ± 0.5	0.001*
Mid upper circumference (cm)	25.8 ± 4.9	28.2 ± 4.0	27.0 ± 4.6	0.063
Midarm muscle circumferer cm)	21.5 ± 4.0	23.2 ± 4.01	22.4 ± 4.1	0.137
Liver Function Test				
Serum Albumin (g/L)	35.2 ± 5.8	29.1 ± 3.7	32.2 ± 5.7	0.001*
Food Record				
Food Record 1 (K/cal)	1036.6 ± 556.3	1503 ± 690.2	1270.2 ± 664.0	0.010
Food Record 2 (K/cal)	1015.4 ± 352.9	1657.7 ± 738.7	1336.5 ± 658.6	0.001*
Food Record 3 (K/cal)	1015.4 ± 352.9	1657.7 ± 738.7	1388.5 ± 755.8	0.001*
Mean Food Record (K/cal)	934.6 ± 349.8	1842.3 ± 73.9	1331.7 ± 625.5	0.001*
Quality of Life				
Domain 1 (Abdominal symptom	15.1 ± 4.3	13.3 ± 6.4	14.2 ± 5.5	0.238
Domain 2 (Fatigue)	15.1 ± 12.1	20.1 ± 7.3	29.6 ± 10.2	0.07
Domain 3 (Systemic symptoms)	19.7 ± 6.5	20.2 ± 8.5	19.9 ± 7.5	0.785
Domain 4 (Activity)	15.7 ± 5.5	14.9 ± 5.6	15.3 ± 5.5	0.583
Domain 5 (Emotional function)	32.3 ± 11.9	25.7 ± 10.7	29.0 ± 11.7	0.041
Domain 6 (Worry)	25.9 ± 6.3	23.5 ± 8.9	24.7 ± 7.7	0.279
Overall Quality of Life Score	133.8 ± 27.9	117.8 ± 38.4	125 ± 34.2	0.092
*Statistically significant at $p \leq 0.05$."				

Comparison of Anthropometric measurements, serum Albumin, food record and quality of life among study participants in two arms of the trial at Follow-up

At follow-up, Group B showed significantly higher BMI, triceps skinfold thickness, mid-upper arm, and midarm muscle circumferences compared to Group A. Serum albumin levels remained significantly higher in Group A (34.4 vs. 29.0). Group B also reported higher food intake. While no significant differences were found in activity, emotional function, worry, and overall quality of life, Group B had significantly better scores in abdominal symptoms, fatigue, systemic symptoms, and overall quality scores

Table 3: Comparison of Anthropometric measurements, serum Albumin, food record and quality of life among study participants in two arms of the trial at Follow-up

Anthropometric measurements	Group A (n = 26)	Group B (n = 26)	Total (n = 52)	P-value
Body Mass index (kg/m^2)	20.2 ± 3.1	23.4 ± 4.7	21.8 ± 4.3	0.006
Tricep skin fold thickness (cm)	1.3 ± 0.4	1.9 ± 0.5	1.6 ± 0.5	0.001*
Mid upper circumference (cm)	24.3 ± 4.1	27.8 ± 3.2	26.1 ± 4.1	0.001*

Midarm muscle circumference (cr	10.4 ± 3.2	23.6 ± 3.7	22.0 ± 3.8	0.001*
Liver Function Test				
erum Albumin (g/L)	34.4 ± 5.3	29.0 ± 3.4	31.7 ± 5.2	0.001*
ood Record				
ood Record 1 (K/cal)	792.3 ± 260.7	1915.4 ± 673.3	1353.8 ± 743.2	0.001*
ood Record 2 (K/cal)	823.1 ± 251.9	1865.4 ± 705.9	1344.2 ± 743.2	0.001*
ood Record 3 (K/cal)	951.9 ± 366.2	1903.8 ± 61.7	1427.9 ± 695.9	0.001*
Mean Food Record (K/cal)	855.1 ± 215.9	1894.9 ± 629.8	1375.3 ± 701.8	0.001*
Quality of Life				
Domain 1 (Abdominal symptoms)	10.9 ± 4.0	15.5 ± 5.7	13.3 ± 5.4	0.001*
Domain 2 (Fatigue)	17.0 ± 5.3	24.3 ± 6.1	20.6 ± 6.7	0.001*
Domain 3 (Systemic symptoms)	17.8 ± 5.6	23.9 ± 8.9	20.9 ± 7.9	0.004*
Domain 4 (Activity)	15.2 ± 5.1	15.6 ± 4.9	15.4 ± 4.9	0.804
Domain 5 (Emotional function)	29.8 ± 9.8	29.6 ± 11.6	29.7 ± 10.6	0.949
Domain 6 (Worry)	23.7 ± 7.3	24.2 ± 7.8	23.9 ± 7.5	0.812
Overall Quality of Life Score	114.5 ± 24.0	133.1 ± 37.3	123.8 ± 32.4	0.037
*Statistically significant at $p \leq 0.05$."				

Comparison of difference in Anthropometric measurements, serum Albumin, food record and quality of life among study participants in two arms of the trial at Baseline and Follow-up

From baseline to follow-up, Group B showed positive mean differences in BMI and midarm muscle circumference, while Group A showed decreases. There was no significant difference in serum albumin changes between the groups. Group B had significantly greater improvements in food intake (record one, two, and average). In terms of quality of life, Group B demonstrated significant improvements in abdominal symptoms, fatigue, systemic symptoms, and overall quality of life. These findings are summarized in Table 4.

Table 4: Comparison of difference in Anthropometric measurements, serum Albumin, food record and quality of life among study participants in two arms of the trial at Baseline and Follow-up

Anthropometric measurements	Group A (n = 26)	Group B (n = 26)	Total (n = 52)	P-value
Body Mass index (kg/m^2)	-1.2 ± 0.7	0.7 ± 2.3	-0.3 ± 2.3	0.004*
Tricep skin fold thickness (cm)	-0.04 ± 0.3	0.03 ± 0.3	-0.004 ± 0.3	0.474
Mid upper circumference (cm)	-1.5 ± 1.9	-0.3 ± 3.6	-0.9 ± 2.9	0.139
Midarm muscle circumference (cm)	-1.1 ± 1.9	0.4 ± 1.6	-0.3 ± 1.9	0.003*
Liver Function Test				
erum Albumin (g/L)	-0.8 ± 1.8	-0.08 ± 1.4	-0.4 ± 1.6	0.123
ood Record				
ood Record 1 (K/cal)	-244.3 ± 512.4	411.5 ± 45.9	83.6 ± 767.5	0.001*
ood Record 2 (K/cal)	-192.3 ± 417.5	207.7 ± 612.5	7.7 ± 556.9	0.001*

ood Record 3 (K/cal)	17.3 ± 296.3	61.5 ± 52.4	39.4 ± 458.1	0.731
Iean Food Record (K/cal)	-139.8 ± 323.2	226.9 ± 578.9	43.6 ± 499.8	0.007
Quality of Life				
Domain 1 (Abdominal symptoms)	-4.2 ± 3.9	2.2 ± 8.2	-0.9 ± 7.1	0.001*
Domain 2 (Fatigue)	-8.1 ± 12.7	4.1 ± 7.1	-1.9 ± 11.9	0.001*
Domain 3 (Systemic symptoms)	-1.8 ± 7.7	3.7 ± 7.6	0.9 ± 8.1	0.012
Domain 4 (Activity)	-0.5 ± 6.5	0.7 ± 6.2	0.9 ± 6.3	0.502
Domain 5 (Emotional function)	-2.5 ± 12.8	3.9 ± 13.6	0.7 ± 13.5	0.087
Domain 6 (Worry)	-2.2 ± 7.1	0.7 ± 9.5	-0.8 ± 8.4	0.228
Overall Quality of Life Score	-19.3 ± 29.3	15.3 ± 38.8	-2.0 ± 38.3	0.001*
*Statistically significant at $p \leq 0.05$."				

DISCUSSION

This quasi-experimental study aimed to evaluate the impact of dietary advice on nutritional status, liver function, and quality of life (QOL) in patients with chronic liver disease (CLD). Results revealed that participants in Group B, who received dietary counseling, showed significant improvements in anthropometric measurements and food intake compared to Group A, emphasizing the value of nutritional guidance in CLD management. Malnutrition is a prevalent issue in cirrhosis, especially in South Asia, where its etiology differs from Western populations, and it remains a leading cause of increased morbidity and mortality [11,12]. Protein-calorie malnutrition affects up to 90% of cirrhosis patients and is associated with poor immune function and higher susceptibility to infections [13,14].

Nutritional intervention improved albumin levels and overall disease status in Group B, supporting prior evidence that emphasizes early nutritional care to reduce complications. Essential nutrients such as vitamins C, D, and E, and trace elements like zinc and selenium, are crucial for maintaining immune responses [15]. The European Society for Clinical Nutrition and Metabolism (ESPEN) recommends a protein intake of 1.2 to 1.5 g/kg/day for cirrhosis patients, and losses in skeletal muscle mass and low albumin levels signal deteriorating nutritional status [16]. Reuter et al. demonstrated that providing nutritional education to healthcare teams increased dietary consultations and decreased hospital readmissions [13].

Participants receiving dietary counseling also had significantly better mean food intake at follow-up, consistent with Kesari et al., who reported poor calorie intake in patients without nutritional guidance, primarily due to disease symptoms and dietary misconceptions [17]. Cultural practices also contribute to reduced protein consumption, affecting clinical outcomes. Hanai et al. highlighted the significance of late-night snacks, branched-chain amino acids, zinc, and probiotics in CLD nutrition therapy [18].

In terms of quality of life, Group B experienced significant improvements across various domains of the Chronic Liver Disease Questionnaire (CLDQ), including fatigue, abdominal symptoms, and systemic symptoms. Teshome et al. also reported that quality of life in CLD patients in Ethiopia was influenced by antiviral treatment, medication use, and educational status, while decompensation history, hospitalization, and rural living negatively affected outcomes [19]. This underscores that, alongside medical interventions, socio-demographic factors play a crucial role in QOL. Chen et al. also emphasized the importance of dietary education for hepatitis patients undergoing antiviral therapy [20].

Overall, the findings affirm that comprehensive nutritional management comprising direct dietary counseling and structured training for healthcare providers significantly improves clinical and QOL outcomes in CLD patients. A multidisciplinary team approach involving dietitians is essential for effective intervention. Dietary advice should respect patient preferences and cultural norms while countering food-related myths. Individualized diet plans must ensure adequate caloric and protein intake. Regular follow-ups should include anthropometric and nutritional evaluations, and family involvement in dietary counseling should be encouraged. From a policy standpoint, continuing medical education (CME) workshops should raise awareness among clinicians about the vital role of dietitians in managing CLD, thus promoting integrated care and improved outcomes [12,13,20].

CONCLUSION

The study highlighted that the dietary advice had positive impact on patients in terms improvement in anthropometric measurements (body mass index, Tricep skin fold thickness, mid upper circumference and Midarm muscle circumference), nutritional intake in terms of calories, improvement in liver function and overall improvement in the quality of life among patients with Chronic Liver Disease. This is of importance that CLD patients should be treated with a multidisciplinary approach with the involvement of dieticians to have dietary recommendation in accordance with the patient's preference, cultural values, and nutritional guidelines. The approach will be valuable in better treatment outcomes in CLD patients.

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