

Therapeutic Education in Cirrhotic Patients: Assessment of Knowledge about the Late Evening Snack

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Abstract

Introduction: African data on the late evening snack (LES) remain scarce. This study aimed to assess the knowledge of cirrhotic patients regarding the LES. **Materials and Method:** A prospective, descriptive and analytical, cross-sectional study was conducted from May 2024 to May 2026 in the Department of Hepato-Gastroenterology of Libreville University Hospital (CHUL), including all adult cirrhotic patients followed, without hepatic encephalopathy. Sociodemographic data, the number of daily meals, and specific knowledge regarding the LES were collected using a standardized form and analyzed with Epi Info 7.2.5.0. **Results:** Fifty cirrhotic patients were included, with a marked male predominance (sex ratio 3.1) and a mean age of 59.0 ± 16.9 years (median 63 years; range 21 - 96 years). Child-Pugh score B accounted for 72% of patients and score C for 28%. Nearly 86% had only two meals per day. No patient was aware of the concept of prolonged nocturnal fasting, had heard of the LES, or knew it was recommended. Although 52% of patients had a daytime snack, none had a late evening snack. Lack of information (68%) and financial difficulties (28%) were the main perceived barriers. Nearly half of the patients (44%) reported being in favor of specialized nutritional follow-up, with no significant association found with the sociodemographic or clinical characteristics studied ($p > 0.05$). **Conclusion:** Knowledge of the late evening snack is almost completely lacking among cirrhotic patients followed at CHUL. The development of therapeutic education programs incorporating international nutritional recommendations may help improve the nutritional status of these patients.

Keywords

Cirrhosis, Therapeutic Education, Late Evening Snack, Nutrition

1. Introduction

Malnutrition and sarcopenia constitute major complications of cirrhosis, associated with increased morbidity and mortality and impaired quality of life [1]. From a pathophysiological standpoint, cirrhotic patients enter a state of metabolic fasting early on, favoring increased protein catabolism and gluconeogenesis from muscle amino acids [2]. The usual dietary pattern of three meals per day, interspersed with a long overnight interval without caloric intake, thus exposes these patients to a prolonged period of catabolism during the night [3].

To limit this period of nocturnal fasting and improve nutritional status, the international recommendations of the European Association for the Study of the Liver (EASL) and the European Society for Clinical Nutrition and Metabolism (ESPEN) advocate dividing food intake into three main meals and three snacks (morning, afternoon, evening), with the late evening snack (LES) considered the most important because it covers the longest inter-meal interval [4] [5]. A seminal randomized trial conducted in 103 cirrhotic patients demonstrated that nocturnal nutritional supplementation continued for 12 months allowed a gain in lean mass equivalent to approximately 2 kg of protein tissue [6], and a meta-analysis of randomized controlled trials confirmed significant effects of the LES on liver parameters [7].

Despite these demonstrated benefits, the practical implementation of this recommendation remains poorly documented in sub-Saharan Africa. A qualitative study conducted in Ghana among cirrhotic patients and healthcare workers highlighted significant gaps in the nutritional management of cirrhosis and a need to improve local practices [8], and a recent review devoted to the management of cirrhosis in a resource-limited context in sub-Saharan Africa underscores the lack of region-specific data to guide nutritional recommendations [9]. After investigation, no study has specifically assessed the knowledge of Gabonese cirrhotic patients regarding the late evening snack. This study therefore aimed to assess the knowledge of cirrhotic patients followed at Libreville University Hospital (CHUL) regarding the late evening snack, in order to identify the therapeutic education needs of this population.

2. Materials and Methods

2.1. Study Design and Setting

This was a prospective, descriptive and analytical study conducted over a 24-month period, from May 2024 to May 2026, in the Department of Hepato-Gastroenterology and Digestive Endoscopy of Libreville University Hospital (CHUL), the main referral center for the management of chronic liver disease in Gabon.

2.2. Study Population

During the study period, 78 cirrhotic patients followed in the department were assessed for eligibility. Of these, 8 were excluded for hepatic encephalopathy, 12 declined to participate, and 8 had an incompletely completed data collection form, leaving 50 patients included in the final analysis.

All adult cirrhotic patients (aged 18 years or older) followed in consultation or hospitalized in the department during the study period were exhaustively included, with a diagnosis of cirrhosis based on a combination of clinical, biological, ultrasonographic, and/or histological findings. Patients with hepatic encephalopathy (of any grade) were not included, owing to the cognitive impairment it causes, which is incompatible with a reliable assessment of knowledge, as were patients who refused to participate in the study or for whom the data collection form could not be completed in full.

2.3. Data Collection

Data were collected prospectively through a questionnaire administered during an individual interview, conducted in French, using a previously tested standardized form comprising three sections: sociodemographic data (age, sex, occupational status, marital status); clinical data, including the etiology of cirrhosis, the Child-Pugh score at inclusion, and the number of daily meals; and a specific section assessing patients' knowledge of the late evening snack (LES) through four items: knowledge of the concept of prolonged nocturnal fasting in cirrhotic patients, having previously heard of the LES, knowledge that it is recommended, and knowledge of its typical composition. Each item was scored in a binary fashion (correct knowledge/no knowledge). This section also explored whether patients took a daytime snack (distinct from the LES) and the acceptability of specialized nutritional follow-up.

For the purposes of this study, the LES was operationally defined as a nutrient-dense snack taken shortly before bedtime (within approximately 30 to 60 minutes of sleep onset), typically providing 200 - 300 kcal and 50 g of complex carbohydrates, intended to shorten the overnight fasting interval. Correct knowledge of each item required the patient to spontaneously and accurately describe, respectively: the concept of prolonged nocturnal fasting in cirrhosis, the existence of the LES, its recommended status, and its typical composition and timing.

Because no participant had prior knowledge of the LES, the interviewer first briefly explained the concept to each patient before asking about perceived barriers to its implementation; a single, mutually exclusive barrier was selected by each patient from the pre-established list (lack of information, financial difficulties, lack of appetite, other).

The form was pilot-tested on a separate group of patients prior to the study to assess clarity and comprehensibility, and adjusted accordingly before the start of data collection.

2.4. Variables Studied

The variables collected included sociodemographic characteristics (age, sex, occupational status, marital status), the etiology of cirrhosis, the Child-Pugh score, the number of daily meals, the four LES knowledge items, daytime snacking, perceived barriers to the LES, and acceptability of nutritional support.

2.5. Statistical Analysis

Data were entered and analyzed using Epi Info software, version 7.2.5.0. Qualitative variables were expressed as frequencies and percentages, and quantitative variables as mean $\pm$ standard deviation or median and range, depending on their distribution. Factors associated with acceptance of specialized nutritional follow-up were investigated using the Chi-square test, or Fisher's exact test when expected theoretical frequencies were below 5. The strength of association was estimated by calculating the crude odds ratio (OR) and its 95% confidence interval (95% CI). The statistical significance threshold was set at $p < 0.05$.

2.6. Ethical Considerations

Informed consent was obtained from each patient included, with respect for data anonymity and confidentiality, each participant being identified by an anonymization number. The study was conducted in accordance with the principles of the Declaration of Helsinki, following institutional authorization from Libreville University Hospital.

3. Results

As shown in **Table 1**, this cohort of 50 cirrhotic patients followed at CHUL presents a sociodemographic profile marked by several notable characteristics. The mean age of patients was 59.0 ± 16.9 years, with a median of 63 years (range: 21 - 96 years). The 60 - 69 year age group was the most represented (38%), followed by the ≥ 70 year group (18%); thus, more than half of the patients (56%) were aged 60 years or older. Conversely, patients under 40 years remained a minority (16%). A marked male predominance was observed, with a sex ratio of 3.1 (38/12, *i.e.*, 76% versus 24%). Only 26% were actively employed, and a minority (4%) were students. Married patients were in the majority (50%), closely followed by single patients (46%), with widowed patients accounting for only 4% of the sample.

Table 1. Distribution according to sociodemographic characteristics (n = 50).

Variables	Number (n = 50)	Percentage (%)
Mean age $\pm$ SD (years)	59.0 $\pm$ 16.9	-
Median (range)	63 (21 - 96)	-
Female sex	12	24

Continued

Male sex	38	76
Sex ratio	3.1	-
<40 years	8	16
40 - 49 years	5	10
50 - 59 years	9	18
60 - 69 years	19	38
≥70 years	9	18
Unemployed	19	38
Retired	16	32
Employed	13	26
Students	2	4
Single	23	46
Married	25	50
Widowed	2	4

Regarding the etiology of cirrhosis, alcohol use was the leading cause (38%), followed by hepatitis B virus infection (32%), hepatitis C virus infection (18%), combined viral-alcoholic etiologies (4% for HBV-alcohol and 4% for HCV-alcohol), and autoimmune hepatitis (4%).

Figure 1 shows that 72% of patients fell into Child-Pugh class B. Score B7 (32%) was the most represented, followed by score B9 (28%) and score B8 (12%). Class C (28%), reflecting severe hepatocellular insufficiency, was dominated by score C12 (14%).

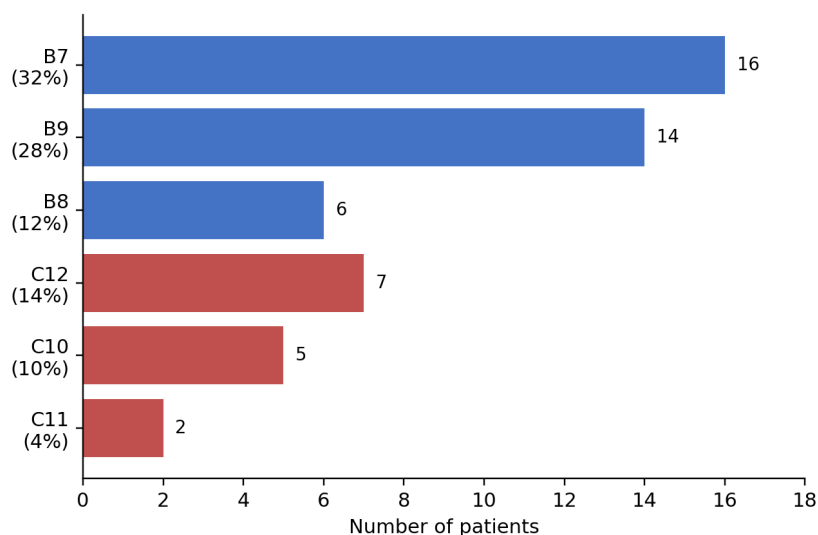


Figure 1. Distribution according to Child-Pugh score.

Figure 2 illustrates the distribution of cirrhotic patients according to the num-

ber of meals taken daily. The large majority of patients (86%) had only two meals per day. Only 10% of patients followed a pattern of three daily meals, and a minority (4%) had only one meal per day.

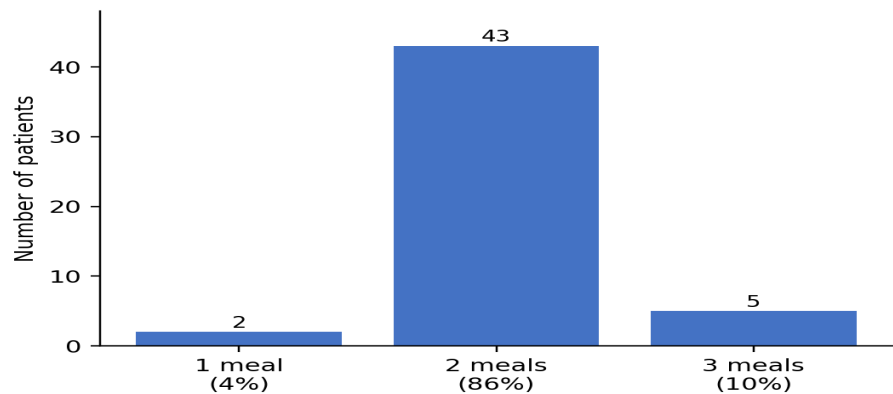


Figure 2. Distribution according to the number of meals per day.

Knowledge of the late evening snack:

No patient interviewed was aware of the concept of prolonged nocturnal fasting, had heard of the late evening snack, knew that it was recommended, or knew its composition (0% for each of these four items). Although 52% of patients had a snack during the day, none had a late evening snack per se.

Barriers identified:

Lack of information was the main perceived barrier to implementing the late evening snack (68%), followed by financial difficulties (28%) and lack of appetite (4%) (**Figure 3**).

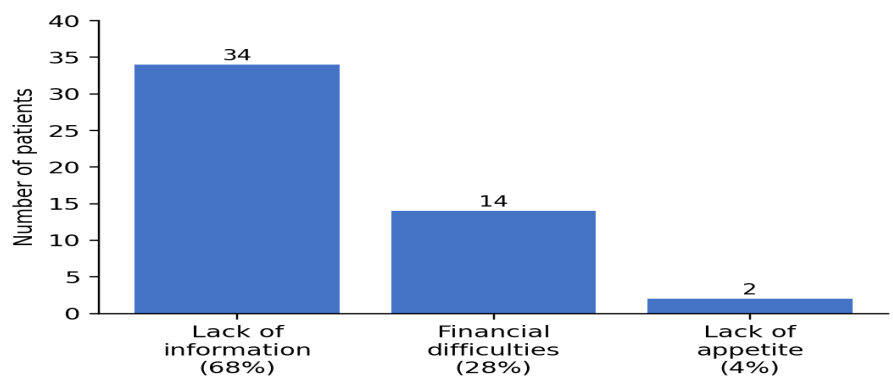


Figure 3. Distribution according to the barriers identified to adherence to the LES among cirrhotic patients.

Acceptance of nutritional follow-up: univariable analysis:

None of the sociodemographic or clinical variables studied was significantly associated with acceptance of specialized nutritional follow-up ($p > 0.05$ for all comparisons), and the 95% confidence intervals of all odds ratios included the value 1. Non-significant trends were nonetheless observed: male patients (OR = 3.00

[95% CI: 0.70 - 12.83]), patients aged 60 years or older (OR = 3.46 [95% CI: 0.59 - 20.21]), and those with Child-Pugh class C (OR = 2.10 [95% CI: 0.60 - 7.33]) appeared more readily favorable to specialized nutritional support (**Table 2**).

Table 2. Factors associated with acceptance of specialized nutritional follow-up among cirrhotic patients (n = 50).

Variables	In favor n/N (%)	Crude OR [95% CI]	p
Sex			0.186
Male	19/38 (50.0)	3.00 [0.70 - 12.83]	
Female	3/12 (25.0)	1	
Age group			0.272
<40 years	2/8 (25.0)	1	
40 - 59 years	5/14 (35.7)	1.67 [0.24 - 11.58]	
≥60 years	15/28 (53.6)	3.46 [0.59 - 20.21]	
Child-Pugh score			0.343
Class C	8/14 (57.1)	2.10 [0.60 - 7.33]	
Class B	14/36 (38.9)	1	
Meals/day			0.520
1 meal	1/2 (50.0)	1.15 [0.07 - 19.60]	
2 meals	20/43 (46.5)	1	
3 meals	1/5 (20.0)	0.29 [0.03 - 2.79]	
Daytime snack			0.783
Yes	12/26 (46.2)	1.20 [0.39 - 3.68]	
No	10/24 (41.7)	1	

4. Discussion

In our study, men accounted for the majority of the population (sex ratio = 3.1), with a mean age of 59 years, the 60 - 69 age group being the most represented. This male predominance is generally reported in the African literature on cirrhosis and could be explained by greater exposure of men to the main risk factors, notably excessive alcohol consumption and chronic viral hepatitis [10]. Itoudi Bignoumba *et al.* in Gabon reported, among 167 patients with decompensated cirrhosis, a male predominance of 61.5% and a mean age of 50 ± 6 years [11].

The majority of our patients belonged to Child-Pugh class B (72%), with class C accounting for 28% of cases, confirming that management is generally initiated at an advanced stage of the disease. This finding falls within the range reported by Itoudi Bignoumba *et al.* in Gabon (58.1% class B and 41.9% class C) [11], whereas other West African series report different proportions, illustrating substantial variability according to the populations studied and the circumstances of screening [9] [10].

The majority of our patients (86%) had only two meals per day, whereas the

recommendations of the European Society for Clinical Nutrition and Metabolism (ESPEN) and the EASL emphasize the need to divide food intake into four to six meals per day, including a late snack before bedtime [4] [5]. This finding could be explained by the context of economic hardship in our country, which often limits access to sufficient food and leads households to reduce the number of daily meals.

No patient interviewed in our study had correct knowledge of the late evening snack. This situation can be explained by several factors identified in certain studies [12]: the absence of structured therapeutic education programs, the limited number of dietitians specialized in the Department of Hepato-Gastroenterology, the priority often given to treating other complications of cirrhosis at the expense of nutritional management, and socioeconomic constraints.

The main barrier identified by patients to implementing the late evening snack was lack of information (68%), suggesting that the obstacles to adopting this recommendation are more related to a deficit in therapeutic education than to patient refusal. Financial difficulties, reported by 28% of patients, call for nutritional advice to be adapted to local resources and to favor accessible foods (local cereals, legumes, eggs, fish, or tubers), allowing a low-cost late evening snack to be prepared [13]. Lack of appetite, reported by 4% of patients, results from multiple mechanisms during cirrhosis (dysgeusia, early satiety related to ascites, digestive disorders, hormonal changes, chronic inflammation), contributing to reduced energy intake and promoting malnutrition.

Nearly half of our patients (44%) reported being in favor of specialized nutritional support, demonstrating genuine openness among patients to nutritional management when it is offered to them. Conversely, the reluctance observed in other patients could reflect an underestimation of the importance of nutrition in the overall management of cirrhosis, as well as financial constraints perceived as a barrier to enhanced follow-up. Ney *et al.* concluded that simple screening during consultation, followed by referral to a multidisciplinary team, is a reasonable strategy [14]. A study on the knowledge, attitudes, and dietary practices of cirrhotic patients explicitly shows that the attitude-practice association was not always significant, explained by external factors such as financial constraints limiting patients' ability to act on their intentions [15].

5. Limitations

This study has some limitations. It was conducted at a single center, which may limit the inference of the findings to other settings in Gabon or the sub-region. The cross-sectional design of the study does not allow any causal or longitudinal inference regarding the impact of therapeutic education on nutritional status.

6. Conclusion

Our results highlight an almost complete lack of knowledge of the late evening snack among cirrhotic patients followed at Libreville University Hospital, associated with an insufficient daily meal frequency relative to international recommen-

dations. They underscore the need to develop structured therapeutic education programs systematically incorporating international nutritional recommendations, which may help improve the nutritional status of patients, prevent sarcopenia, and potentially reduce the morbidity associated with cirrhosis.

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Author Contributions

Engoang AA and Adom M conceived the study and drafted the protocol. Nzouto PD, and Nsegue A contributed to patient inclusion and data collection. Itoudi Bignoumba PE, Maganga Moussavou Taba IF, and Mbounja M performed the statistical analyses and literature review. Moussavou Kombila JB supervised the study and revised the final manuscript. All authors read and approved the final manuscript.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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