



Nutritional assessment and treatment of patients with acute pancreatitis: Observational study at the “Alejandro Posadas National Hospital”

Evaluación y tratamiento nutricional en pacientes con pancreatitis aguda: estudio observacional en el Hospital Nacional Alejandro Posadas

Avaliação e tratamento nutricional em pacientes com pancreatite aguda: um estudo observacional no Hospital Nacional Alejandro Posadas

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Received: June 26th, 2022.

Accepted: August 20th, 2022.

Published online: August 25th, 2022.

DOI: 10.35454/rncm.v5n4.423

Abstract

Introduction: Acute pancreatitis is a highly metabolic disease. An early initiation of feeding can self-limit catabolism and lead to better outcomes. The characteristics of the nutritional treatment implemented in hospitalized patients in Argentina are unknown.

Objectives: To report on the nutritional status and the characteristics of the nutritional therapy implemented in patients with acute pancreatitis admitted to the Alejandro Posadas National Hospital, and to analyze the association between nutritional status and severity of acute pancreatitis, its complications, the use of nutritional therapy, and length of hospital stay.

Methods: Descriptive cross-sectional study. A database with data collected from October 2019 to October 2021 at a third level hospital in Buenos Aires was used. A descriptive analysis of the variables was carried out and Kendall's Tau b test was used to assess association ($p < 0.05$).

Results: A sample of 55 patients was obtained, 70.9% female with a median age of 40-years. Overall, 81.8% of the acute pancreatitis cases were mild, 49.1% had malnutrition, associated with acute pancreatitis severity ($p < 0.001$), the onset of complications ($p < 0.001$), and use

Resumen

Introducción: la pancreatitis aguda es una enfermedad altamente metabólica. El inicio temprano de la alimentación autolimita el catabolismo y conlleva a mejores resultados. Se desconoce el tratamiento nutricional implementado en la Argentina.

Objetivos: conocer el estado nutricional de los pacientes con pancreatitis aguda y las características de la terapia nutricional implementada en el Hospital Nacional Alejandro Posadas, así como analizar la asociación entre el estado nutricional con respecto a la gravedad de la pancreatitis aguda, las complicaciones, el uso de la terapia nutricional y la estancia hospitalaria.

Métodos: estudio transversal y descriptivo. Se utilizó información recabada desde octubre de 2019 a octubre de 2021, en un hospital de tercer nivel de Buenos Aires. Se realizó un análisis descriptivo de las variables y la prueba de Tau b de Kendall para evaluar su asociación ($p < 0,05$).

Resultados: se obtuvo una muestra de 55 pacientes. El 70,9 % fue femenino, con una mediana de edad de 40 años. El 81,8 % de las pancreatitis fue leve. El 49,1 % presentó malnutrición, la cual se asoció significativamente con la gravedad de la pancreatitis aguda ($p < 0,001$), la aparición de las complicaciones ($p < 0,001$) y el uso

Resumo

Introdução: a pancreatite aguda é uma doença altamente metabólica. O início precoce da alimentação leva a uma autolimitação do catabolismo o que implica melhores resultados. O tratamento nutricional implementado na Argentina é desconhecido.

Objetivos: conhecer o estado nutricional de pacientes com pancreatite aguda e as características da terapia nutricional implementada no Hospital Nacional Alejandro Posadas, bem como analisar a associação entre o estado nutricional em relação à gravidade da pancreatite aguda, as complicações, o uso da terapia nutricional e a internação hospitalar.

Métodos: estudo transversal e descritivo; foi utilizada a informação coletada desde outubro de 2019 até outubro de 2021 em um hospital terciário de Buenos Aires. Foi realizada uma análise descritiva das variáveis e o teste Tau b de Kendall para avaliar associação ($p < 0,05$).

Resultados: Obteve-se uma amostra de 55 pacientes. O 70,9 % foram do sexo feminino com idade mediana de 40 anos. O 81,8 % das pancreatites foram leves. 49,1 % apresentaram desnutrição, que foi significativamente associada com a gravidade da pancreatite aguda ($p < 0,001$), ao aparecimento de complicações ($p <$



of nutritional therapy ($p < 0.002$) but not with length of stay ($p 0.16$). Body mass index was not associated with any of the variables mentioned above. Overall, 71% started late feeding. 14.5% received enteral nutrition and 7.2% received parenteral nutrition during hospitalization. **Conclusions:** Malnutrition is common in patients with acute pancreatitis. Frequently, feeding was initiated late. Patients with malnutrition developed a more severe disease, more complications and required nutritional therapy more frequently.

Keywords: Acute pancreatitis; Nutritional status; Nutrition therapy.

de la terapia nutricional ($p < 0,002$), no así con la estancia hospitalaria ($p 0,16$). El índice de masa corporal no se relacionó con ninguna de las variables mencionadas. El 71 % empezó a alimentarse de forma tardía. El 14,5 % recibió nutrición enteral y 7,2 % parenteral durante la internación.

Conclusiones: la malnutrición es frecuente en pacientes con pancreatitis aguda. El inicio de la alimentación suele ser tardío. Aquellos pacientes con peor estado nutricional desarrollaron una mayor gravedad de la enfermedad, mayores complicaciones y requirieron terapia nutricional con mayor frecuencia.

Palabras clave: pancreatitis aguda, evaluación nutricional, terapia nutricional.

0,001), ao uso de terapia nutricional ($p < 0,002$), mas não ao tempo de internação hospitalar ($p 0,16$). O índice de massa corporal não se relacionou com nenhuma das variáveis citadas. O 71 % iniciaram a alimentação tardiamente. O 14,5 % receberam nutrição enteral e 7,2 % parenteral durante a internação.

Conclusões: a desnutrição é comum em pacientes com pancreatite aguda. O início da alimentação costuma ser tardio. Aqueles pacientes com pior estado nutricional desenvolveram maior gravidade da doença, maiores complicações e necessitaram de terapia nutricional com maior frequência.

Palavras-chave: pancreatite aguda, avaliação nutricional, terapia nutricional.

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INTRODUCTION

Acute pancreatitis (AP) is an inflammatory condition of the pancreas that can cause local injury, systemic inflammatory response syndrome, organ failure, and death⁽¹⁻³⁾. The number of hospital admissions related to AP has doubled in the last three decades and is currently one of the leading causes of gastrointestinal-related hospitalizations^(4,5).

Biliary stones are the primary etiology of AP, followed by alcohol abuse. This is described both in Argentina and worldwide, although the incidence may vary among populations^(1, 3, 6, 7). The clinical course is diverse, with 20 % of cases classified as severe, bearing a 30 % mortality rate. Predicting the severity level is a key aspect of the initial management of AP, as it determines the transfer to specialized centers, admission to intensive care units (ICUs), and the implementation of specific therapies^(1,3,4,6,8).

AP is a highly metabolic disease, where an inflammatory cascade is activated. Additionally, nutritional therapy (NT) can modulate oxidative stress, maintain intestinal function, preserve acinar structure, and reduce catabolism to prevent malnutrition (MN) or its exacerbation^(5,9-11).

For a long time, one of the main treatments of AP was bowel rest because it was believed that food stimuli

would promote the release and activation of pancreatic enzymes, leading to more tissue damage⁽²⁾.

Currently, there is no scientific basis to support this hypothesis, and it has been demonstrated that early initiation of feeding (within the first 24-48 hours after the onset of the condition) improves nitrogen balance, reduces the incidence of infections, mortality, and hospital stays. As a result, the pancreatic stimulation generated is minimal. For this reason, various clinical practice guidelines recommend early oral feeding for patients with mild AP^(4,6,12,13).

However, there is a subgroup of patients (moderate or severe AP) who develop a state of hypermetabolism and inflammation, which leads to increased caloric-protein requirements and rapid nutritional deterioration. While the preferred route is oral, in cases where oral feeding cannot be initiated, early enteral nutrition (EN) improves disease progression and nutritional status⁽¹¹⁻¹⁴⁾. It is also worth noting the risk of developing exocrine pancreatic insufficiency (EPI), which can occur in severe or necrotizing AP and, transiently, in mild AP. EPI is defined as a state of malabsorption of nutrients, primarily fats, and is often characterized by symptoms such as steatorrhea, abdominal distension, weight loss, among others. EPI leads to caloric-protein malnutrition and vitamin deficiencies⁽¹⁴⁻¹⁸⁾.

Despite numerous studies worldwide investigating the management of AP^(3, 19-26), the characteristics of the nutritional treatment currently employed in Argentina are unknown. Therefore, this study's main objective is to describe the nutritional status and the NT provided to patients with AP in a public hospital, and to analyze the association between nutritional status, as assessed by Subjective Global Assessment (SGA) and body mass index (BMI), in relation to the severity of AP, potential AP complications, the use of NT, and length of hospital stay (LOS).

MATERIALS AND METHODS

Study design

A descriptive cross-sectional study was conducted at the Alejandro Posadas National Hospital, a public tertiary care center located in Buenos Aires, Argentina. The study included all patients over 18 years of age with a LOS exceeding 72 hours, diagnosed with AP according to the International Working Group of the International Association of Pancreatology (IAP) and the American Pancreatic Association (APA) Acute Pancreatitis Guidelines⁽¹³⁾, in the adult inpatient and ICUs between October 2019 and October 2021. Patients with AP caused by malignancy were excluded. Those who were readmitted to the hospital were not included again. Patients who were isolated due to COVID-19, discharged from the institution, or deceased before the complete data collection were also excluded. Non-probability convenience sampling was used.

The study received approval from the ethics committee of the Alejandro Posadas National Hospital and adhered to the international research standards set by the Helsinki Declaration of the World Medical Association, Law 3301 of the Ministry of Health of the Government of the City of Buenos Aires, Resolution 1480/2011 of the Ministry of Health of the Nation, as well as all legislations and regulations endorsed by the institution's ethics and research committee.

Data collection

A database containing information previously collected by registered dietitians was used. The patients' medical records were used to gather information on sex, age, relevant clinical factors (diabetes, obesity, toxic habits, pancreatitis recurrence, pregnancy/postpartum, gallstones), the etiology of AP, and LOS (≤ 7 days, 8 to 15 days, 16 to 30 days, and > 30 days). The severity of AP

was defined according to the Atlanta classification⁽²⁷⁾ as mild (absence of local or systemic complications and organ failure), moderate (local complications with or without organ failure for less than 48 hours), and severe (persistent organ failure lasting more than 48 hours)^(28, 29).

Nutritional assessment

Nutritional diagnosis was conducted within the first 72 hours after admission using the SGA. Patients were categorized as well-nourished, moderately malnourished, or severely malnourished⁽³⁰⁾. Additionally, BMI was calculated and categorized according to the World Health Organization (WHO) cut-off points⁽³¹⁾. The reported weight and height data used for BMI calculation were provided by the patients.

Nutritional intervention

Early initiation was defined as feeding starting within < 48 hours, and late initiation as > 48 hours. Furthermore, the prescribed diet was documented as: liquids (including only water and clear liquids easily assimilated with low-fat, lactose-free, no acidic juices), full liquids (including clear liquids and oral nutritional supplements [ONS]), or a low-fat solid diet (with 26 % fat content). In cases where EN or parenteral nutrition (PN) was indicated, the reason for either prescription and the formula used in EN was also registered.

Pancreatitis-related local complications during hospitalization

The presence of necrosis was categorized as follows: < 30 %, between 30 % and 50 %, and > 50 %, along with the presence of liquid collections or pseudocysts based on the clinical history.

Statistical analysis

For quantitative variables, measures of central tendency (mean and median) were used alongside their corresponding dispersions (interquartile range), after the evaluation of the normality or not of the data. Concerning qualitative variables, confidence intervals, absolute counts, and percentages were calculated.

To analyze the association between the ordinal qualitative variables SGA and BMI with other ordinal factors, Kendall's Tau-b test was used and for its association to nominal factors, a comparison of proportions was calculated, considering values with $p < 0.05$ as sta-

tistically significant. The collected data were analyzed using the Stata MP 14.0.

RESULTS

Out of the 73 patients included, 18 were excluded due to insufficient data or early hospital discharge, resulting in a final sample of 55. The median age was 40 years (33-48), with 70.9 % of the sample corresponding to females. The most prevalent etiology was biliary (90.9 %). In terms of severity, 81.8 % were classified as mild, 14.5% as severe, and 3.6% as moderate. Common clinical aspects included overweight and obesity, alcohol and tobacco consumption, and gallstone disease (see Table 1). The median LOS was 13 days, ranging from 9 to 21 days. Among patients, 18 % had a LOS of ≤ 7 days, 38 % between 8 and 15 days, 21 % between 16 and 30 days, and 21 % > 30 days. All patients with complications exhibited pancreatic necrosis (Table 2). The mortality rate was 1.8 %⁽¹⁾.

Nutritional assessment

According to the SGA, 50.9 % were categorized as well-nourished, 30.9 % with severe MN, and 18.2% with moderate MN. Regarding BMI, the median was 29.4 kg/m²(24-33). No patients with underweight were documented; 41.7 % were categorized as obese, 30.9 % as normal weight, and 27.2 % as overweight.

Nutritional intervention

29 % of patients could initiate oral feeding early, while the remaining 71 % started with late oral feeding or EN. Regarding the type of diet, 81.8 % started with clear liquids, 3.6 % with full liquids, 11% with a low-fat diet, and the remaining 3.6 % with EN. During the course of hospitalization, 14.5 % (n = 8) required EN or PN. All 8 received EN, and 4 patients additionally required PN (7.2 % of the total sample).

The reasons for prescribing EN were persistent abdominal pain, intolerance to oral feeding, ileus, and the inability to meet nutritional requirements. Of the 8 patients receiving EN, 7 had pancreatic necrosis. Both gastric and post-pyloric access were used in 50 % of patients with EN. The initial formula was semi-elemental in 62.5 % of patients, while 12.5 % started with a polymeric formula, and in the remaining 25 % the formula used was not documented. A continuous infusion pump was used in all cases.

Table 1. Sociodemographic aspects. Summary of the etiology, severity, and clinical aspects of acute pancreatitis

	Median	Interquartile range
Age	40	33-48
Length of stay	13	9-21
	Result n (%)	CI
Gender		
- Female	39 (70.9)	
- Male	16 (29.1)	
Etiology		
- Biliary	50 (90.9)	82.76-97.23
- Hypertriglyceridemia	2 (3.6)	-3.63-10.83
- Pharmacological	1 (1.82)	-5.41-9.05
- Alcoholic	1 (1.82)	-5.41-9.05
Severity		
- Mild	45 (81.8)	73.7-88.2
- Moderate	2 (3.6)	-3.63-10.83
- Severe	8 (14.5)	6.76-21.23
Clinical aspects		
- Overweight and obesity	41.8 (76)	68.76-83.23
- Alcohol consumption	18 (32.7)	24.7-39.23
- Tobacco	17 (31)	23.76-38.23
- Gallstone disease	22 (40)	32.76-47.23
- Diabetes	7 (12.7)	4.76-19.23
- Pregnancy or postpartum	6 (11)	3.76-18.23
- Recurrence of pancreatitis	3 (5.45)	-2.23-12.23

IC: Confidence interval.

Table 2. Local complications

	Results n (%) N = 55	CI 95 %
Complications	10 (18.1)	10.75-25.23
Pancreatic necrosis	10 (18.1)	10.75-25.23
- Less than 30 %	1 (10)	
- Between 30 %-50 %	2 (20)	
- More than 50 %	5 (50)	
- Not quantified	2 (20)	
Fluid collections	6 (11.3)	3.76-18.23
Pseudocysts	2 (3.77)	-4.23-10.23

CI: Confidence interval.

The indications for PN were pain at the start of EN, intolerance to EN, ileus, or the inability to meet nutritional requirements by other means. One of the four patients with PN received post-pyloric EN. All patients who received PN developed pancreatic necrosis during hospitalization.

Nutritional assessment and adverse clinical outcomes

The SGA was significantly associated with the occurrence of complications ($p < 0.001$). There was a higher frequency of complications in patients with severe MN (8/17) than without MN (1/28), with a Kendall's Tau-b of 0.4461 (Table 3). Additionally, MN was associated with the severity of pancreatitis ($p < 0.002$), the use of EN ($p < 0.002$), and PN ($p = 0.007$), but not with LOS ($p = 0.16$). In contrast to the SGA, BMI was not related to the severity of pancreatitis ($p = 0.3100$), the occurrence of complications ($p = 0.1194$), or the use of EN and/or PN ($p = 0.3477$); BMI was also not related to LOS ($p = 0.7679$).

DISCUSSION

The objective of the study was to assess the nutritional status of patients with AP and the NT implemented in the hospital. Additionally, it aimed to analyze the association between the nutritional status concerning the severity of the disease, complications, use of EN/PN, and LOS. The results indicated that despite evidence supporting the benefits of early initiation of feeding in AP patients, it continued to be delayed. This exacerbates MN, predisposed by the disease itself, increasing the risk of complications and the need for nutrition therapy.

Some studies suggest that obesity increases the risk of severe AP and mortality⁽³²⁾. Conversely, other authors did not find a direct link between obesity and the seve-

riety of AP, but observed a higher frequency of systemic complications⁽³³⁾. In this study, 68.9 % of patients were classified as overweight or obese (27.2 % overweight and 41.7 % obese) based on BMI. Moreover, 49.1 % of patients were diagnosed with MN (18.2% moderate MN and 30.9% severe MN). It is crucial to note that MN or the risk thereof can easily go unnoticed, especially in overweight or obese patients.

Disease-related MN predicts poorer outcomes, regardless of BMI. Therefore, BMI alone should not be used as an indicator of nutritional status, as it does not capture the variability in body composition. This study demonstrated worse clinical outcomes in patients diagnosed with MN according to SGA, highlighting the importance of this tool. Worse outcomes were not found based on BMI, undermining the utility of this tool.

Regarding the initiation of oral intake, guidelines recommend starting solid food within 24-72 hours of admission, once abdominal pain decreases along with inflammatory markers and the patient expresses appetite. However, it should be noted that approximately 20 % of patients experience a recurrence of pain when they begin oral feeding^(4, 6). In this study, 29 % of patients initiated early oral intake. Although it is important to mention that the recommendation to start early oral intake with solid food, as proposed by guidelines, occurred in only 11 % of the sample.

On behalf of the type of initial feeding, despite recommendations outlined in the guidelines, a recent study evaluated, through a survey targeted at healthcare professionals, the current practice patterns in nutritional management of pancreatitis. The results showed that 57.3 % started oral intake with liquids (clear liquids 40.3 %, full liquids 17 %) and 21 % with a low-fat diet⁽¹²⁾. In this study, 81.8 % of patients started with clear liquids, 11 % with a solid low-fat diet, 3.6 % with full liquids, and the remaining 3.6 % started with EN.

Table 3. Nutritional assessment and pancreatitis complications

SGA	No complications	Complications	Total	Kendall's Tau-b
Well-nourished	27	1	28	0.4461 ($p < 0.001$)
Moderated malnutrition	9	1	10	
Severe malnutrition	9	8	17	
Total	45	10	55	

SGA: Subjective Global Assessment.

The high percentage of patients who started late feeding with only liquid intake could be due to misconceptions about the duration of bowel rest, pancreatic enzyme secretion, and exacerbation of digestive symptoms.

As a notable discovery, an association was observed between the utilization of NT and the severity of AP ($p = 0.0000$). Additionally, all patients receiving PN were classified with severe MN (see Table 4), underscoring the crucial role of dietitians in the clinical context.

Concerning EN, current evidence suggests the use of the nasogastric route due to its greater feasibility compared to the post-pyloric route, in addition to being deemed safe and well-tolerated⁽⁴⁾. In the present study, EN was administered to 14.5 % of the patients, with 50 % utilizing the gastric route, and the remaining the post-pyloric route.

The most commonly used EN formula was the semi-elemental one at 62.5 %, despite current recommendations⁽⁴⁾ advocating for the initial use of a polymeric formula with a shift to a semi-elemental formula if the former is not well-tolerated. However, upon analyzing patients who received this formula, it was observed that 100 % presented pancreatic necrosis, and 75 % had severe MN, which justifies its selection⁽³⁴⁾.

In a review conducted by Hollemans *et al.*⁽³⁵⁾, tracking 1495 patients for 36 months after AP, it was noted that 27.1 % of individuals developed EPI with a higher risk of alcoholic etiology, severe AP, and necrotizing pancreatitis. The current study disclosed a prevalence of pancreatic necrosis of 18.2 %, surpassing the 50 % threshold of pancreatic tissue involvement, in most cases. Therefore, after hospitalization, it is considered crucial to evaluate the development of EPI through the observation of gastrointestinal symptoms, nutritional parameters, and the measurement of fecal elastase.

The 56 % of patients who presented with gallstone-induced AP were discharged with resolved surgery,

which partly explains the extended hospital stays identified. Deferred cholecystectomy post-discharge exposes patients to a recurrence of the episode⁽³⁾.

The outcomes of this study will serve as a pivotal basis for informed decision-making to enhance current medical and nutritional treatments. It is mandatory to validate these results through future studies that encompass a larger and more diverse patient population.

As limitations of the study, it is worth noting its retrospective design and the achieved sample size. Additionally, some patients were hospitalized during the COVID-19 pandemic, which complicated data collection and lead to incomplete variables. We believe that it would have been highly valuable to follow up with patients' post-discharge, especially in those who presented with pancreatic necrosis.

CONCLUSIONS

The results demonstrated that MN is common in patients with AP. Despite available evidence supporting the benefits of early initiation of feeding in AP patients, it was delayed, which emphasizes the need for ongoing work on interdisciplinary protocols to enhance medical and nutritional practices.

On the other hand, it was observed that patients with poorer nutritional status developed greater disease severity, more complications, and required NT more frequently than well-nourished patients. No significant association was found between nutritional status and hospital length of stay.

Acknowledgments

We would like to express our gratitude to all individuals who contributed to the completion of this work, especially the Adult Inpatient Department of the Alejandro Posadas National Hospital, Marcela Mariano, a mem-

Table 4. Pancreatitis severity and nutritional therapy

	Mild	Moderate	Severe	Total	Kendall's Tau-b
Without nutritional therapy	45	0	2	47	0.8517 ($p < 0.001$)
Enteral nutrition	0	2	2	4	
Enteral and parenteral nutrition	0	0	4	4	
Total	45	2	8	55	

ber of the Research and Teaching team of the Alejandro Posadas National Hospital, and Dr. Silvia Gutiérrez for their dedication and constant motivation in the integral treatment of patients with pancreatic pathologies.

Funding

This study did not receive any funding.

Conflicts of interest

The authors declare that they have no conflicts of interest.

Authorship Statement

C. Real, P. Navarro, E. Gómez, and M. Canicoba contributed equally to the conception and design of the research, acquisition, analysis, and interpretation of the data. All authors drafted and revised the manuscript, agreed to be fully accountable for ensuring the integrity and accuracy of the work, and read and approved the final manuscript.

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