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The Prevalence of Protein-Calorie Malnutrition among Patients with Alcoholic, Non-alcoholic, and Chronic Viral Cirrhosis in the United States: A Population-Based Study

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Abstract

Aim: Identify the prevalence of protein-calorie malnutrition among patients with alcoholic, non-alcoholic, and chronic viral cirrhosis in the United States.

Methods: A validated multicenter database (Explorys Inc) was used for this study. A cohort of patients with a SNOMED-CT diagnosis of "Protein-Calorie Malnutrition" between 2016-2021 was selectedexcluding all patients with age <18 years, pregnancy, eating disorders, Roux-en-Y gastrojejunostomy, celiac disease, chronic pancreatitis, and liver transplant. Multivariate analysis was performed to control for multiple factors influencing our outcome of interest.

Results: 74,226,890 individuals were screened in the database and 27,672,070 were included in the final analysis. The prevalence of protein-calorie malnutrition among patients with alcoholic, non-alcoholic, and chronic hepatitis B or C cirrhosis was 10.9%, 6.9%, and 2.0%; respectively. Protein-calorie malnutrition was more common among patients with alcoholic (OR 6.34), non-alcoholic fatty liver (OR 4.27), and chronic hepatitis B or C. Active smoking (OR 3.12), alcoholism (OR 3.45), and IV drug abuse (OR 3.77) were independently associated with higher risk for malnutrition.

Conclusion: Alcoholic cirrhosis, followed by non-alcoholic, and chronic hepatitis B/C cirrhosis are associated with a significantly increased risk of malnutrition. Independently of the liver status, active smoking, alcoholism, and IV drug abuse are also associated with increased risk.

Introduction

- Malnutrition is commonly identified among patients with cirrhosis with a wide prevalence rate of **23-60%** and is associated with increased mortality and **liver-related complications** like hepatic encephalopathy, infections, and ascites.
- Our aim is to identify the **prevalence** of protein-calorie malnutrition among patients with alcoholic, non-alcoholic, and chronic viral cirrhosis in the United States.

Methods and Materials

- A validated **multicenter** database (**Explorys** Inc) of more than 360 hospitals from 26 different healthcare systems and ~70 million patients across the United States was used for this study. A cohort of patients with a SNOMED-CT diagnosis of "Protein-Calorie Malnutrition" between 2016-2021 was selected. We excluded all patients with age < 18 years, pregnancy, eating disorders, Roux-en-Y gastrojejunostomy, celiac disease, chronic pancreatitis, and liver transplant.
- Statistical Package for Social Sciences (**SPSS** version 25, IBM Corp) was used for statistical analysis, and for all analyses, a 2-sided p-value of <**0.05** was considered statistically significant. **Multivariate analysis** was performed to adjust for multiple factors including age, sex, race, smoking, intravenous drug abuse, alcohol abuse, alcoholic cirrhosis, non-alcoholic fatty liver disease cirrhosis, and chronic hepatitis B or C cirrhosis.

		Malnutrition in % (n= 331,080)	Control Group in % (n=27,672,070)
Age	18-65	38.0 (125,820)	72.0 (19,933,640)
	>65	62.0 (205,260)	28.0 (7,738,430)
Sex	Male	47.4 (156,890)	42.7 (11,817,350)
	Female	52.6 (174,190)	57.3 (15,854,720)
Race	Caucasians	68.8 (227,750)	58.4 (16,161,010)
	African-American	18.1 (59,840)	11.6 (3,219,690)
	Asian	1.4 (4,480)	1.6 (451,960)
Comorbidities	Type 2 Diabetes Mellitus	38.9 (128,930)	12.2 (3,388,290)
	Hypertension	74.0 (245,040)	30.3 (8,385,810)
	Hyperlipidemia	62.1 (205,600)	27.0 (7,466,270)
	Alcoholic Cirrhosis	4.1 (13,420)	0.2 (55,270)
	Non-Alcoholic Fatty Liver Cirrhosis	4.6 (15,260)	0.3 (96,760)
	Chronic Viral Cirrhosis (HBV, HCV)	2.4 (7,920)	0.3 (74,120)

Table 1. Baseline Characteristic of Patients with Protein-Calorie Malnutrition and Control Group

		Odds Ratio (95% CI)	P-value
Demographics	Age> 65	4.24 (4.22-4.27)	0.00
	Females	1.43 (1.42-1.44)	0.00
	Caucasians	1.39 (1.37-1.40)	0.00
Substance Abuse	Active Smoking	3.12 (3.10-3.14)	0.00
	Alcoholism	3.45 (3.41-3.50)	0.00
	Other Substance Abuse	3.77 (3.73-3.81)	0.00
Cirrhosis	Alcoholic	6.34 (6.21-6.47)	0.00
	Non-Alcoholic Fatty Liver	4.27 (4.18-4.35)	0.00
	Chronic Viral Cirrhosis	3.92 (3.85-3.98)	0.00

Table 2. Multivariate Analysis for Protein-Calorie Malnutrition in the Study Population

Results

- 74,226,890 individuals were screened in the database and 27,672,070 were included in the final analysis. The prevalence of malnutrition was **1.2%.** The baseline characteristics of patients with protein-calorie malnutrition are shown in **Table 1**.
- The **prevalence** of protein-calorie malnutrition among patients with alcoholic, non-alcoholic, and chronic hepatitis B or C cirrhosis was **10.9%**, **6.9%**, and **2.0%**; respectively. Elderly (**OR 4.24**), females (**OR 1.43**), and Caucasians (**OR 1.39**) were at higher risk for malnutrition. Protein-calorie malnutrition was more common among patients with alcoholic (**OR 6.34**), non-alcoholic fatty liver (**OR 4.27**), and chronic hepatitis B or C (**OR 3.92**). Active smoking (**OR 3.12**), alcoholism (**OR 3.45**), and IV drug abuse (**OR 3.77**) were independently associated with higher risk for malnutrition (**Table 2**).

Conclusion

- This is the **largest** study in the US enhancing the prevalence of protein-calorie malnutrition among different populations including **alcoholic**, **non-alcoholic**, and **chronic viral** cirrhotic.
- Alcoholic cirrhosis, followed by non-alcoholic and chronic hepatitis B/C cirrhosis are associated with a significantly **increased** risk of malnutrition.
- Independently of the liver status, active smoking, alcoholism, and IV drug abuse are also associated with **increased** risk.

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