Title

Soaring rates of alcohol-related hepatitis in the latter phase of the COVID-19 pandemic: A new normal?

Journal

JGH Open, 7(2)

ISSN

2397-9070

Authors

Sohal, Aalam
Khalid, Sameeha
Green, Victoria
et al.

Publication Date

2023-02-01

DOI

10.1002/jgh3.12864

JGH Open Open Access An open access journal of gastroenterology and hepatology

JGHF Journal of Gastroenterology and Hepatology Foundation

doi:10.1002/jgh3.12864

ORIGINAL ARTICLE

Soaring rates of alcohol-related hepatitis in the latter phase of the COVID-19 pandemic: A new normal?

Aalam Sohal,* Sameeha Khalid,* Victoria Green,* Jeffrey Hagino,* Hunza Chaudhry,* Alakh Gulati† and Marina Roytman†

Departments of *Internal Medicine and †Gastroenterology and Hepatology, University of California, Fresno, California, USA

Key words
alcohol, alcohol-related hepatitis, COVID-19 pandemic, hepatology.

Accepted for publication 3 January 2023.

Correspondence
Victoria Green, University of California, 155 N Fresno St, San Francisco, Fresno, CA 93701, USA.
Email: victoria.green@ucsf.edu

Declaration of conflict of interest: None.

Abstract

Background: Studies have reported that the COVID-19 pandemic has led to an increase in alcohol consumption and alcohol-associated health problems in the general population. Our previous study documented a rise in severe alcohol-related hepatitis cases requiring inpatient admission in our hospital system in the early pandemic (2019 vs. 2020). This study assesses the rates of severe alcohol-related hepatitis in the latter part of the pandemic (2021).

Methods: We performed a retrospective chart review via an electronic medical record to evaluate the number of cases of alcohol-related hepatitis in patients presenting to three community hospitals in Fresno, California, between 2019 (pre-pandemic) and 2021. A total of 547 patients were included in the study. We compared the demographics, clinical course, and outcomes of patients with alcohol-related hepatitis pre-pandemic (2019), early pandemic (2020), and during the later phase of the pandemic (2021).

Results: The number of cases increased from 131 in 2019 to 201 in 2020 and 215 in 2021 (53% and 64% increase, respectively). The number of young patients (age <40 years) increased from 30 in 2019 to 61 in 2020 and 71 in 2021 (103% and 136% increase, respectively) ($p = 0.13$). The number of admissions of women increased from 24 in 2019 to 55 in 2020 and 67 in 2021 (129% and 179% increase, respectively) ($p = 0.026$). Deaths during hospitalization increased from 20 in 2019 to 26 in 2021 ($p = 0.674$). The number of rehospitalizations within 3 months increased 4.5 times from 18 in 2019 to 80 in 2021 ($p < 0.001$).

Conclusion: Our study revealed that the admissions for alcohol-related hepatitis remained significantly above the pre-pandemic levels through the end of 2021. We believe this sustained increase in cases of alcohol-related hepatitis in our hospital system reflects a much larger national problem. Alcohol-related hepatitis is associated with significant morbidity, mortality, and societal cost. Urgent public health interventions are needed at a national level to prevent this rise in cases from becoming a new normal.

Introduction

COVID-19 caused by SARS-CoV2 has had important direct and indirect effects on patients with alcohol-related liver disease.[1] The direct effects have been attributed to changes in drinking patterns and increased alcohol consumption attributed to pandemic-related stress. This increased alcohol consumption has been documented by the early pre-pandemic epidemiologic and marketing data, which documented a sharp increase in alcohol use in the general population. Similar to the general population, an increase in alcohol sales was documented in patients with a history of preexisting alcohol use disorder (AUD).[2] The indirect effects can be attributed to delayed care, medication noncompliance, and the inability to stay abstinent, which has been documented during the COVID-19 pandemic.[1,2] The well-documented rise in alcohol consumption, coupled with major societal disruptions, led to dramatic increases in cases of alcohol-related hepatitis (ARH). As a result, there was a significant rise in the number of patients requiring liver transplantation for alcohol-related liver disease leading to an increased burden on the healthcare system.[3,4]

According to CDC, there has been a rise in alcohol-induced death rates during the COVID-19 pandemic. They reported that the age-adjusted rate of alcohol-induced deaths increased by 26% between the years 2019 and 2020.[5] Julien et al. have hypothesized that the increase in the consumption of alcohol during the COVID-19 pandemic in 2020 will have long-lasting effects.[6] They estimated that this would result in 8000 additional liver-related deaths, 18 700 cases of decompensated

cirrhosis, and 1000 causes of HCC. Because of this mounting concern about the growing impact of ARH, we performed a retrospective analysis at our institution between 2019 and 2020, which showed a drastic increase in the cases of ARH between 2019 and 2020, especially after stay-at-home orders.[7] We hypothesized that this increase is not transient and would persist in the latter part of the pandemic as the societal disruptions due to COVID-19 continued and patterns of increased alcohol consumption became ingrained. In this study, we explore the patterns of ARH in our hospital system in the pre-pandemic (2019), early pandemic (2020), and late pandemic (2021) eras.

Methods

Study population. This study was approved by the Institutional Review Board (IRB) and complied with the Health Insurance Portability and Accountability Act (HIPAA). Data were collected from the Electronic Medical Records of the Community Medical Center system, which consisted of three hospitals in Fresno, California (Community Regional Medical Center, Clovis Community Medical Center, and Fresno Heart and Surgical Hospital). We collected data for quarterly hospitalizations of patients with a diagnosis of ARH (K70.10 and K70.11) or alcohol-related hepatic failure (K70.40 and K70.41) between January 1, 2019, and December 31, 2021. A total of 639 patients were identified. A diagnosis of ARH was made per the following criteria for inclusion in the study: AUD within the last 3 months of presentation, elevated white blood cell count >10 × 10^3/μl, aspartate transaminase/alanine transaminase ratio of >2:1, and elevated total bilirubin >1.2 mg/dL. Patients under 18 years of age and pregnant patients were excluded from the study. A total of 547 patients were included in the study. We compared the demographics, clinical course, and outcomes of patients with ARH pre-pandemic (2019), early pandemic (2020), and during the later phase of the pandemic (2021).

Study variables. The following data were collected: quarterly hospitalizations of patients diagnosed with ARH and alcohol-related hepatic failure from January 1, 2019, to December 31, 2022. Data on age, gender, race, hazardous drinking patterns (defined as 14 or more drinks for men and seven or more drinks for women in a week), comorbidities, and rehospitalization rates were collected and compared between 3 years. The laboratory values included white blood cell count, alanine transaminase, aspartate transaminase, creatinine, and international normalized ratio, which were also used to calculate Maddrey discriminant function (MDF) scores and model for end-stage liver disease-sodium (MELD-Na) scores.

We also compared the number of patients who required endoscopic procedures, steroids, intensive care unit (ICU) admission, and intubation as well as the incidence of complications such as acute kidney injury and initiation of hemodialysis between 3 years. Data were also collected on prolonged length of hospitalization, defined as >15 days, rehospitalization within 3 months, and deaths during admission.

Statistical analysis. STATA 17 was used for analysis. To study the points mentioned above, basic frequencies were run to calculate means and SDs. Associations and correlations were tested using $\chi 2$ and Pearson correlation testing. For continuous variables, independent-sample *t-tests* were run to calculate *p*-values to assess differences.

Table 1 Demographics of patients admitted with ARH stratified by year

	2019 (N-131)	2020 (N-201)	2021 (N-215)	*p*-value
Mean age (y)	48.4	47.4	46.55	0.156
Age <40	30 (22.9)	61 (30.3)	71 (33)	0.13
40–60	81 (61.8)	106 (52.7)	110 (51.2)	0.132
Age >60	20 (15.3)	34 (17)	34 (15.8)	0.914
Men	107 (81.7)	146 (72.6)	145 (67.4)	**0.026**
Women	24 (18.3)	55 (27.3)	67 (31.2)	**0.026**
Hispanics	71 (55)	95 (47.2)	111 (51.6)	0.373
Non-Hispanics	58 (45)	105 (52.2)	101 (46.9)	0.373
Men >14 drinks/week	81 (75)	94 (46.8)	111 (51.6)	0.143
Women >7 drinks/week	15 (62.5)	42 (20.9)	47 (21.9)	0.944

Note: Bolded values are those with *p* values signifying statistical significance.

Results

Demographics. Mean age of patients admitted with ARH continued to decrease from 48.4 in 2019 to 46.55 in 2021. The total number of patients under the age of 40 has increased from 30 in 2019 to 71 in 2021 (reflecting a 136% increase in the total hospitalizations compared with 2019). The number of female patients has increased from 24 in 2019 to 67 in 2021 (reflecting a 179% increase). A complete list of patient demographics is presented in Table 1.

Comorbidities. In 2019, ARH was diagnosed in six patients (4.5%) with hepatitis B. This number increased to 15 (7.5%) in 2020, followed by a decrease to 9 (4.2%) in 2021 ($p = 0.264$). In 2019, ARH was diagnosed in 20 (15.3%) patients with hepatitis C. This was followed by 26 (12.9%) patients in 2020 and 16 (7.4%) patients in 2021 with a history of hepatitis C being diagnosed with ARH ($p = 0.028$). There was also an increase in the number of cases with prior ARH between 2019 and 2021. In 2019, 57 (43.5%) patients who were admitted had a prior diagnosis of ARH, while in 2020, this number increased to 100 (49.8%), followed by a decline in 2021 to 83 patients

Table 2 Comorbidities of patients admitted with alcohol-related hepatitis, stratified by year

Past medical history	2019	2020	2021	*p*-value
Hepatitis B	6 (4.5)	15 (7.5)	9 (4.2)	0.264
Hepatitis C	20 (15.3)	26 (12.9)	16 (7.4)	**0.028**
Prior alcohol-related hepatitis	57 (43.5)	100 (49.8)	83 (38.6)	**0.044**
Non-alcoholic fatty liver	4 (3.1)	9 (4.5)	26 (12.1)	**0.003**
Non-alcoholic steatohepatitis	11 (8.3)	15 (7.5)	5 (2.3)	**0.014**
Chronic liver conditions	31 (23.7)	55 (27.3)	50 (23.2)	0.6

Note: Bolded values are those with *p* values signifying statistical significance.

Table 3 Quarter-wise distribution of alcohol-related hepatitis cases stratified by year

Quarter	No. patients in 2019	No. patients in 2020	No. patients in 2021
Q1	34	35	53
Q2	32	40	46
Q3	31	69	60
Q4	34	57	56
Total	131	201	215

(38.6%) ($p = 0.044$). The number of patients with preexisting chronic liver conditions increased from 31 (23.7%) in 2019 to 50 (23.2%) in 2021 ($p = 0.6$). A complete list of comorbidities is presented in Table 2.

Case numbers. A total of 547 patients met the inclusion criteria. There was a significant increase in the number of patients in 2020 compared with 2019 (201 vs. 131, reflecting a 53% increase). The number of cases in 2021 has increased slightly compared with 2020 (7% increase), however significantly compared with the pre-pandemic level (215 vs. 131, reflecting a 64% increase). Most admissions were seen in the third quarter of 2020 and 2021. Quarter-wise distribution of cases of ARH, stratified by year, is presented in Table 3 and Figure 1.

Severity and complications. There was a decrease in the mean MDF score from 47.82 to 35.7 between 2019 and 2021 ($p = 0.01$). However, the mean MELD scores were largely unchanged between 2019 and 2021 ($p = 0.36$). In 2019, 20 patients died during hospitalization compared with 26 in 2021 and 2022 ($p = 0.647$). The number of patients with acute kidney injury increased in 2020 to 66 compared with 47 in 2019 and decreased to 47 in 2021 ($p = 0.005$). The number of patients requiring hemodialysis has not changed significantly between the three years (16 in 2019, 14 in 2020, and 13 in 2021) ($p = 0.094$). A significant increase was noted in the number of rehospitalizations between 2019 and 2021 (80 in 2021 vs. 18 in 2019) ($p < 0.001$). Mean laboratory values and outcomes are presented in Table 4. The number of endoscopies in patients with ARH decreased between 2019 and 2020 and then increased again in 2021 ($p = 0.009$). A complete list of mean laboratory values and outcomes is presented in Table 4.

Table 4 Mean laboratory values and outcomes in hospitalized patients with alcohol-related hepatitis between 2019 and 2021

	2019	2020	2021	*p*-value
Mean Maddrey discriminant function score	47.82	40.77	35.7	**0.01**
Mean MELD score	20.72	19.61	20.2	0.36
Mean albumin	3.25	3.18	3.25	0.808
Mean bilirubin	8.90	7.39	8.23	0.679
Mean INR	1.813	1.69	1.62	0.166
Mean creatinine	3.6	1.2	1.36	0.148
Endoscopy	41	35	**52**	**0.009**
Steroid use	26	34	27	0.155
ICU admission	33	57	50	0.475
Intubation	21	41	31	0.251
Acute kidney injury	47	66	47	**0.005**
Hemodialysis	16	14	13	0.094
Death during admission	20	26	26	0.647
Rehospitalized within 3 months	18	37	**80**	**<0.001**

Note: Bolded values are those with *p* values signifying statistical significance.

Discussion

Our study demonstrated that the increase in severe ARH requiring hospital admission persisted beyond the initial onset of the COVID-19 pandemic. The number of cases of ARH in 2021

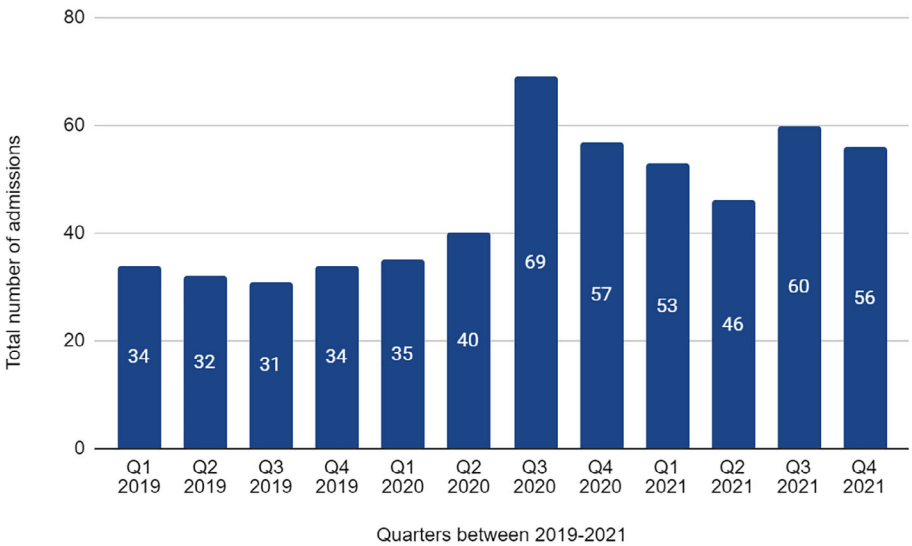

Figure 1 Quarter-wise distribution of cases between 2019 and 2021

surpassed the number of cases in 2019 and 2020. A sharp increase of 53% was noted in the number of cases between 2020 and 2019, with a further increase of 7% increase between 2020 and 2021, resulting in 64% increase in 2021 as compared with the pre-pandemic levels. Our study reveals a sustained increase in severe ARH since the beginning of the COVID-19 pandemic, with implications that reach a national level.

Between 2019 and 2021, the mean age of patients with ARH decreased from 48 to 46 years. We also found an alarming 103% increase in hospitalizations for patients under 40 years in 2021 compared with 2019 and a further increase of 136% in 2021 as compared with the pre-pandemic level. Though the overall increase between 2020 and 2021 is not as stark (53% compared with 64%), there is a notably steep increase in younger patients (103% compared with 136%) and women (129% compared with 179%), which reflects a disproportionate impact on these vulnerable subgroups. These concerning and persistent findings may be attributed to long-lasting consequences related to socioeconomic stressors brought on by the pandemic.

The number of women hospitalized with ARH increased by 179% in 2021 as compared with 2019. A survey published in the Journal of the American Medical Association revealed a 41% increase in heavy alcohol consumption among women in the first several months of the COVID-19 pandemic.[8] Multiple studies have elucidated a high impact of the pandemic on women across the United States as a result of disproportionate job losses, impact of prolonged school closures, reduced social interactions, and higher overall stress levels.[9,10] The rise of AUD in women is of significant concern as it is well known that women have a higher propensity for developing alcohol-related liver disease.

Of significant concern, close to 50% of patients have had prior episodes of ARH. Many of the patients also had preexisting liver disease. Recurrent ARH has been reported to be more severe and protracted as reflected by prognosticating scores like the MELD and MDF scores. It is also known to lead to higher levels of complications and higher hospital readmissions.[11]

The 90-day hospital readmission rate in our study increased substantially from 18 in 2019 to 80 in 2021. This finding illustrates the increased strain on our hospital system, ongoing challenges of obtaining treatment for AUD in the community, and potentially increasing disease severity leading to rehospitalizations. The discrepant findings of a decrease in the mean MDF score and unchanged MELD-NA score between 2019 and 2021 may be due to the limited statistical power of our study and will require further investigation.

There was a statistically significant decrease in the number of patients undergoing endoscopy between 2020 ($n = 35$) and 2019 ($n = 41$). This was attributed to the COVID-19 infection control measures and staff hesitancy in doing procedures during the pandemic. In 2021, the numbers increased to 52, likely due to the relaxation of strict infection control measures and providers/staff being vaccinated against COVID-19. Reduction in endoscopies during the COVID-19 pandemic has been documented in multiple studies in the Netherlands[12] and Portugal.[13] This decrease in the number of endoscopies affected not only patients with alcohol-related liver disease but also a decline in colon cancer detection rates during the COVID-19 pandemic.[12] Our results show that the decrease in the number of inpatient endoscopies was transient, and the numbers have increased back to pre-pandemic levels.

Limitations of our study include its retrospective nature, small sample size, and limited geographical reach.

Conclusions

Our study indicates an ongoing surge in cases of ARH in the latter phase of the COVID-19 pandemic. ARH is associated with significant morbidity, mortality, and societal cost. Further nationwide studies are urgently needed to evaluate the overall impact of alcohol-related liver diseases since the beginning of COVID-19 pandemic. Urgent public health interventions are needed at a state and national level to curb this disease and prevent this rise in cases from becoming a new normal.

References

1 Alcohol-Associated Liver Disease Before and After COVID-19—An Overview and Call for Ongoing Investigation.
2 Kim JU, Majid A, Judge R *et al*. Effect of COVID-19 lockdown on alcohol consumption in patients with pre-existing alcohol use disorder. *Lancet Gastroenterol. Hepatol.* 2020; **5**: 886–7.
3 Rutledge SM, Schiano TD, Florman S, Im GY. COVID-19 aftershocks on alcohol-associated liver disease: an early cross-sectional report from the U.S. Epicenter. *Hepatol. Commun.* 2021; **5**: 1151–5.
4 Anderson MS, Valbuena VSM, Brown CS *et al*. Association of COVID-19 With New Waiting List Registrations and Liver Transplantation for Alcoholic Hepatitis in the United States. *JAMA Netw. Open*. 2021; **4**: e2131132.
5 Spencer MR, Curtin SC, Garnett MF. *Alcohol-induced Death Rates in the United States, 2019–2020*. USA: National Center for Health Statistics, 2022.
6 Julien J, Ayer T, Tapper EB, Barbosa C, Dowd WN, Chhatwal J. Effect of increased alcohol consumption during COVID-19 pandemic on alcohol-associated liver disease: A modeling study. *Hepatology*. 2022; **75**: 1480–90.
7 Sohal A, Khalid S, Green V, Gulati A, Roytman M. The Pandemic Within the Pandemic: Unprecedented Rise in Alcohol-related Hepatitis During the COVID-19 Pandemic. *J. Clin. Gastroenterol.* 2022; **56**: e171–5.
8 Pollard MS, Tucker JS, Green HD. Changes in Adult Alcohol Use and Consequences During the COVID-19 Pandemic in the US. *JAMA Netw. Open.* 2020; **3**: e2022942.
9 Wardell JD, Kempe T, Rapinda KK *et al*. Drinking to Cope During COVID-19 Pandemic: The Role of External and Internal Factors in Coping Motive Pathways to Alcohol Use, Solitary Drinking, and Alcohol Problems. *Alcohol. Clin. Exp. Res.* 2020; **44**: 2073–83.
10 Gezici A, Ozay O. An Intersectional Analysis of COVID-19 Unemployment. *J. Econ. Race Policy.* 2020; **3**: 270–81.
11 Potts JR, Howard MR, Verma S. Recurrent severe alcoholic hepatitis: clinical characteristics and outcomes. *Eur. J. Gastroenterol. Hepatol.* 2013; **25**: 659–64.
12 Lantinga MA, Theunissen F, Ter Borg PCJ *et al*. Impact of the COVID-19 pandemic on gastrointestinal endoscopy in The Netherlands: analysis of a prospective endoscopy database. *Endoscopy*. 2021 Feb; **53**: 166–70.
13 Impact of the COVID-19 Pandemic on Gastroenterology Department Activity: The Gastroenterologist's Perspective Nationwide and the Real Impact in a Portuguese Center.