

and its rescue treatment regimens were not evaluated in this study. However, we identified that among 244 SOF/VEL/VOX non-responders, a majority were infected with HCV genotypes GT1 (58%) and GT3 (34%), nearly two-thirds (60%) had cirrhosis, more than two-thirds had a previous history of treatment with DAAs, and a few had received ribavirin. Despite the contraindication to use of PIs according to current treatment guidelines,<sup>4,5</sup> the SOF/VEL/VOX regimen was prescribed in a small number of patients with decompensated cirrhosis.

Pre-treatment evaluation for re-treatment in SOF/VEL/VOX treatment failures should include an assessment for potential drug-drug interactions. Consideration should also be given to adding weight-based ribavirin to regimens of GLE/PIB ± SOF or SOF/VEL/VOX, and extension of treatment duration as these may increase the chance of successful rescue treatment. Consistent with available evidence, EASL and AASLD guidelines recommend adding weight-based ribavirin for patients with cirrhosis with HCV GT3 infection previously treated with NS5A inhibitors.<sup>4,5</sup> Further investigations into the role of RAS testing to guide individualized approaches to salvage therapy are needed to support evidence-based guidelines. Available data support current guidelines for the re-treatment of SOF/VEL/VOX non-responders with SOF + GLE/PIB ± ribavirin or SOF/VEL/VOX ± ribavirin for 12–24 weeks.<sup>4,5</sup>

### Financial support

The authors received no financial support to produce this manuscript.

### Conflict of interest

HK, MSR, none; OF, research funds paid to Johns Hopkins University (Abbvie); JKL, research contracts (to Yale University): Allergan, Celgene, Eiger, Genfit, Intercept, Pfizer, Viking.

Please refer to the accompanying ICMJE disclosure forms for further details.

### Authors' contributions

Idea development: JKL, OF, and HK; Data collection: HK and MSR; Drafting the manuscript: HK and MSR; Critical revision of the manuscript: JKL and OF.

### Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jhep.2022.06.024>.

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## Internet search engines and social media are improving awareness on non-alcoholic fatty liver disease in Brazil

To the Editor:

The authors read with great interest the recently published manuscript by Lazarus *et al.*,<sup>1</sup> highlighting that no nation is properly tackling the emerging global challenge of non-alcoholic fatty liver disease (NAFLD). To our knowledge, this is

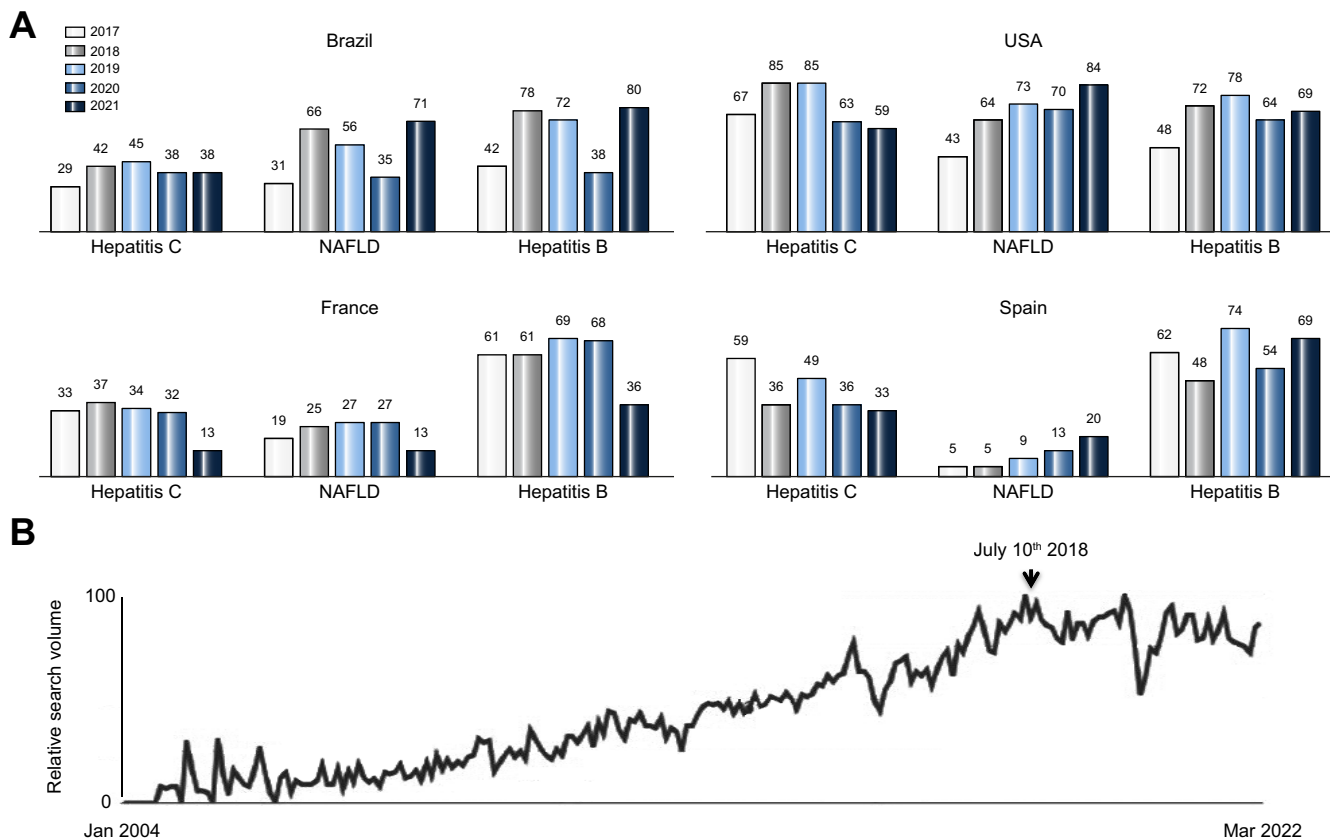
Keywords: Non-alcoholic fatty liver disease; awareness; social media; knowledge.  
 Received 26 April 2022; received in revised form 22 May 2022; accepted 14 June 2022;  
 available online 08 July 2022  
<https://doi.org/10.1016/j.jhep.2022.06.020>

also the situation in Brazil, because no public policy for NAFLD is now under discussion and no civil society organization is currently providing advocacy for this disease. In spite of this situation, a recent population-based survey sponsored by the Brazilian Liver Institute (IBRAFIG) regarding knowledge of the general population about liver diseases led to unexpected results.

This survey was designed to be representative of the Brazilian population, comprised of 1,995 participants. Interestingly, NAFLD (better known in Brazil as fatty liver) ranked 2<sup>nd</sup> and 3<sup>rd</sup> as the most commonly recognized cause of liver cancer and cirrhosis, respectively, by the general population, just after alcohol abuse and smoking. In addition, more than half of the participants agreed that fatty liver could lead to diabetes, cirrhosis, myocardial infarction and/or stroke and cancer. Those findings regarding population knowledge about NAFLD were much better than those previously reported<sup>3,4</sup> and demonstrated that the Brazilian population had a higher-than-average level of awareness of the burden of NAFLD. This may be due to previous campaigns conducted by IBRAFIG and other organizations to improve disease awareness or possibly the effect of social media increasing public interest about this subject. In order to assess this hypothesis, we analyzed internet search patterns over time using Google Trends for fatty liver in Brazil as well as 3 other countries, namely Spain, France, and the USA. For multiple comparisons, we have used the relative search volume, which is the query share of a particular term for a given location and time period, normalized by the highest query share of that term over time series. The resulting

numbers are put on a scale in a range of 0 to 100 based on a topic's proportion to all searches on all topics.<sup>5</sup> The relative search volume of fatty liver in Brazil and other countries were then compared to those of viral hepatitis B and C. Each time fatty liver turned out to be a trending topic on social media, namely Instagram and Facebook in Brazil, its impact on relative search volume was also evaluated.

Fig. 1A depicts mean relative search volume results for fatty liver, hepatitis B, and C in Brazil, Spain, France, and the USA in the last 5 years.<sup>6</sup> Greater mean relative search volume on Google Trends was observed in the Americas when compared to Europe. Interestingly, internet searches in Brazil and the USA quoting 'fatty liver' were much more common than searches quoting 'hepatitis C', which apart from alcohol-related liver disease is the main cause of cirrhosis and liver cancer in these countries. Fig. 1B discloses the Google Trends graphics of relative search volume results of fatty liver from 2004 to 2022 in Brazil.<sup>6</sup> There was a continuous increase in public interest in fatty liver over time with a peak on July 10<sup>th</sup> 2018 followed by an oscillatory plateau. There was a correlation with the post of a social media influencer, with more than 30 million (more than 10% of the Brazilian population) followers on Instagram that day announcing his diagnosis of NAFLD and his fight to avoid cirrhosis and cancer with lifestyle changes. This post had 2 million likes and was followed by great mass media coverage over an entire week. No other episode of fatty liver as a trending topic on social media was recognized over time in Brazil. Those data altogether may in part explain the higher-



**Fig. 1. Search term volumes and trends in Brazil, Spain, France and the USA.** (A) Mean relative search volume according to specific searches related to hepatitis B and C and NAFLD in the last 5 years in 4 different countries; (B) Google Trends graphics of relative search volume results of fatty liver in Brazil from 2004 to 2022.

than-average knowledge of the Brazilian population about NAFLD and suggest that social media could turn out to be a powerful tool to rapidly increase civil awareness about the global burden of NAFLD. However, it is worth mentioning that social media may increase negative feeling and stigma related to NAFLD, raising some concerns about information handling in Twitter as well as in other platforms.<sup>7</sup> Therefore, when using social media, it is of utmost importance to provide links to dedicated homepages of any relevant medical or civil societies engaged in fighting against NAFLD.

Google Trends metrics could also be very useful to measure the NAFLD awareness campaign's effectiveness in raising public interest on the topic as more and more people worldwide are using the web to get information on health issues and are spending more time online.

In summary, we would agree with the authors that we still need to improve the preparedness index to tackle NAFLD, but we would like to suggest, in addition, that social media could play a valuable role in increasing disease awareness.

### Financial support

The authors received no financial support to produce this manuscript.

### Conflict of interest

The authors disclose no conflicts of interest.

Please refer to the accompanying ICMJE disclosure forms for further details.

### Authors' contributions

Paulo L Bittencourt was responsible for conceptualization, methodology, visualization and writing the original draft. Claudia P. Oliveira, Liana codes and Maria Lúcia G. Ferraz contributed equally for resources, manuscript review and editing.

### Data availability statement

Data and study materials will not be made available to other researchers.

### Acknowledgements

The authors would like to acknowledge the support of the Brazilian Liver Institute.

### Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jhep.2022.06.020>.

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## Low accuracy of FIB-4 test to identify people with diabetes at low risk of advanced fibrosis

To the Editor:

We read with great interest the article by Boursier *et al.* recently published in *Journal of Hepatology*.<sup>1</sup> In a multicentre cohort of patients with NAFLD, the authors examined the prognostic accuracy of the stepwise Fibrosis-4 (FIB-4) – vibration-controlled transient elastography (VCTE) algorithm for non-invasive fibrosis risk stratification,<sup>2</sup> for the prediction of cirrhosis complications, hepatocellular carcinoma, and death.

The algorithm proposes FIB-4 as a first step to identify individuals at low risk (FIB-4 <1.3) of advanced fibrosis who can be managed in primary care. People with indeterminate or high-risk scores (FIB-4 ≥1.3) need additional assessment with VCTE, and those at increased risk of significant fibrosis (VCTE ≥8 kPa) require hepatology referral for further evaluation of possible advanced fibrosis. The authors found that overall, patients with FIB-4 <1.3 had a very low risk of liver-related events, validating use of the pathway to retain patients with a good prognosis in primary care. However, the presence of diabetes (defined as use of antidiabetic medications) was an

Received 31 May 2022; accepted 9 June 2022; available online 25 June 2022  
<https://doi.org/10.1016/j.jhep.2022.06.016>