



# REVISTA DE GASTROENTEROLOGÍA DE MÉXICO

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## SCIENTIFIC LETTER

### Transitioning from NAFLD to MAFLD to MASLD in the Mexican population

#### Transicionando de NAFLD a MAFLD y a MASLD en la población mexicana

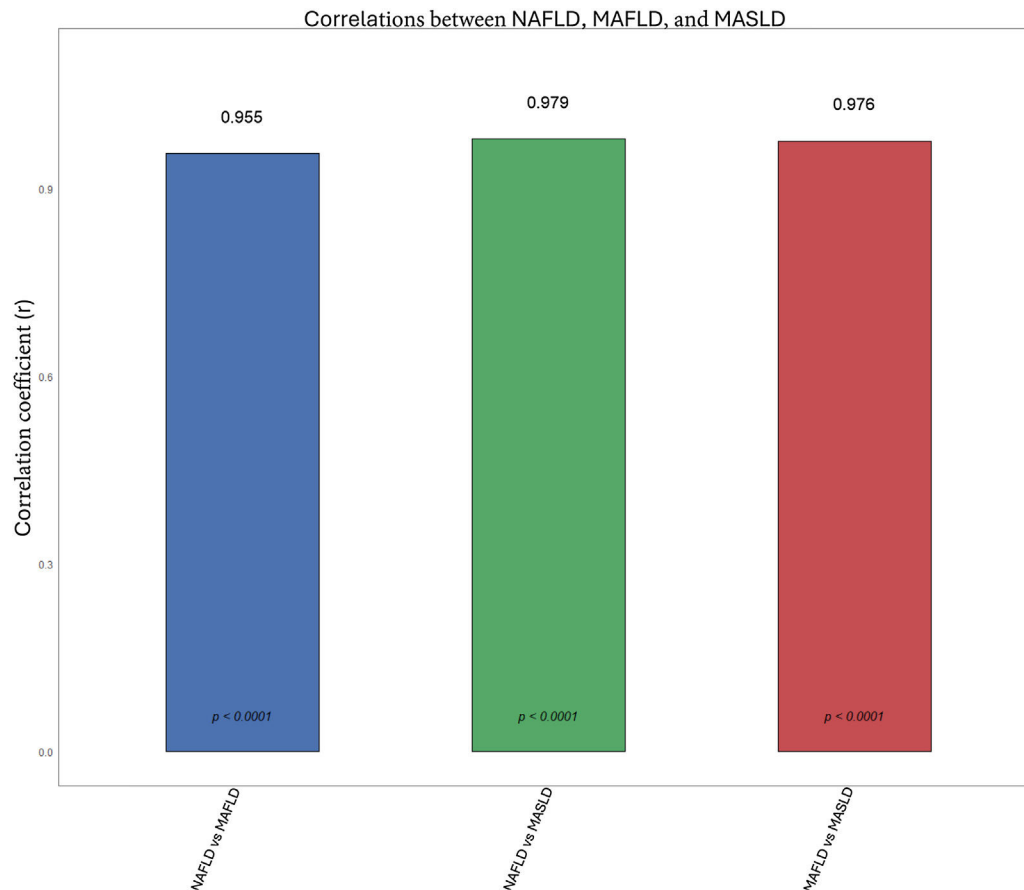
Recently, the nomenclature for nonalcoholic fatty liver disease has significantly evolved. Originally known as NAFLD, the term was updated to MAFLD (metabolic dysfunction-associated fatty liver disease), and more recently, to MASLD (metabolic dysfunction-associated steatotic liver disease), whose Spanish equivalent is *esteatosis hepática metabólica* (metabolic hepatic steatosis).<sup>1</sup> This evolution reflects a broader and more accurate approach that is in accordance with the understanding of the pathophysiology of the disease.

In this context, we have read the Letters to the Editor of Hagström et al.,<sup>2</sup> Song et al.,<sup>3</sup> and Ratzu et al.<sup>4</sup> with great interest. Those authors argue that the differences between NAFLD and MASLD are minimal, and thus maintain that applying the findings of previous studies on NAFLD to the new definition of MASLD is a reasonable proposition. Likewise, they propose that there is no need to conduct new confirmatory studies during the transition from NAFLD to MASLD.

NAFLD is defined as an accumulation of fat in the liver, in the absence of significant alcohol use, as well as of apparent secondary causes, such as viral hepatitis or lipogenic medication use. This diagnosis is based mainly on ruling out other causes.<sup>5,6</sup> In contrast, MAFLD is characterized by the presence of hepatic steatosis accompanied by one or more criteria, including overweight, obesity, type 2 diabetes mellitus, or at least 2 additional metabolic factors, such as

**Table 1** Correlations between NAFLD, MAFLD, and MASLD

Variable	NAFLD n = 255	MAFLD n = 242	MASLD n = 249
<b>Sociodemographic data</b>			
Prevalence	43.7%	41.4%	42.6%
Age	51 (41-58)	51 (41-58)	51 (41.5-58)
Sex			
Women	166 (65.1%)	158 (65.3%)	163 (65.5%)
BMI	31.6 (28.8-35.4)	31.9 (29.3-35.9)	31.8 (29.1-35.4)
Visceral fat	3.5 (2.8-4.5)	3.5 (2.8-4.6)	3.5 (2.8-4.6)
Obesity	163 (63.9%)	163 (67.4%)	163 (65.5%)
Type 2 diabetes mellitus	52 (20.4%)	52 (21.5%)	52 (20.9%)
Systemic arterial hypertension	93 (36.5%)	90 (37.2%)	93 (37.3%)
Hypercholesterolemia	58 (22.7%)	57 (23.6%)	58 (23.3%)
Hypertriglyceridemia	159 (62.4%)	155 (64%)	159 (63.9%)
<b>Biochemical data</b>			
Glucose	94 (87-106)	95 (87-107)	94 (87-106.5)
Platelets	238 (198-289)	239.5 (198.7-289.2)	239 (199-289)
Creatinine	0.80 (0.70-1)	0.80 (0.70-1)	0.80 (0.70-1)
Uric acid	6 (5-7)	6.05 (5.1-7)	6 (5-7)
Total cholesterol	197 (172-220)	197 (173.5-219.2)	197 (174-220)
Triglycerides	164 (124-220)	167.5 (127-222.2)	167 (126-221)
AST	31 (25-40)	32 (25-41)	32 (25-40.5)
ALT	33 (25-48)	34 (26-49)	34 (26-48.5)
HDL	49 (41-29.9)	48.8 (40.9-132.6)	49 (41-59.7)
LDL	109 (87.7-132.6)	109.4 (87.8-132.6)	109.2 (88.3-132.6)
Albumin	4.1 (3.9-4.3)	4.1 (3.9-4.3)	4.1 (3.9-4.3)
FIB-4	1. (0.77-1.62)	1.1 (0.77-1.59)	1.1 (0.77-1.62)



**Figure 1** Similarities between NAFLD, MAFLD, and MASLD. The Spearman's Rho was used for the correlations. NAFLD: nonalcoholic fatty liver disease; MAFLD: metabolic dysfunction-associated fatty liver disease; MASLD: metabolic dysfunction-associated steatotic liver disease (named *esteatosis hepática metabólica* in Spanish).

dyslipidemia or high blood pressure, among others.<sup>7</sup> This change in terminology reflects the consideration of hepatic steatosis as a component of metabolic syndrome, moving from a rule-out diagnosis to a rule-in one.

For its part, MASLD requires the presence of hepatic steatosis and at least one cardiometabolic criterion.<sup>8,9</sup> With respect to MAFLD, the main modification is the reduction in the number of cardiometabolic criteria necessary for the diagnosis, enabling an earlier identification of the individuals affected, as well as replacing the word "fatty" with "steatotic", which could contribute to reducing the stigma associated with the disease.

It should be pointed out that individuals with NAFLD are distinguished from those with MAFLD because NAFLD describes a more general condition that does not necessarily involve metabolic disorders, whereas MAFLD requires the presence of steatosis, together with specific metabolic factors, without taking other secondary causes of steatosis into consideration. In addition, due to the number of metabolic criteria necessary, not all individuals with MASLD meet the criteria for being diagnosed with MAFLD, whereas by requiring 2 metabolic criteria for MAFLD, 100% of individuals with normal range alcohol use should meet the criteria for MASLD.

Recent studies have shown that up to 99% of individuals with NAFLD also meet the criteria for MASLD,<sup>2</sup> but this relation has yet to be studied in the Mexican population.

In 2020, our group studied the prevalence of MAFLD in a Mexican population with no significant alcohol use and found a prevalence of 41.3% in a representative sample of 585 individuals.<sup>10</sup>

We conducted a new analysis, in which we categorized and compared individuals, according to the criteria of NAFLD, MAFLD, and MASLD. The results indicated that 94.9% of the individuals identified as having NAFLD ( $n = 255$ ) also met the criteria for MAFLD ( $n = 242$ ), and 97.6% ( $n = 249$ ) of the individuals with NAFLD met the criteria for MASLD, whereas 100% of the individuals classified as having MAFLD met the criteria for MASLD, with no significant sociodemographic or biochemical differences between nomenclatures. The prevalence of MASLD in our population was 42.6%. Table 1 shows the descriptive statistics between the 3 classifications.

Regarding the correlations observed, strong correlations were identified between NAFLD and MAFLD ( $r = 0.955$ ,  $p < 0.0001$ ), NAFLD and MASLD ( $r = 0.979$ ,  $p < 0.0001$ ), and MAFLD and MASLD ( $r = 0.970$ ,  $p < 0.0001$ ), as shown in Fig. 1. Excellent concordance was also observed between NAFLD and MAFLD (kappa index = 0.954), NAFLD and MASLD (kappa index = 0.974), and MAFLD and MASLD (kappa index = 0.975).

In conclusion, 97.6% of the individuals with NAFLD met the criteria for MASLD and all the individuals classified as having MAFLD met the criteria for MASLD. Based on

these data, and as occurs in other populations, we suggest that the information of previous studies on NAFLD and MAFLD in the Mexican population can be extrapolated to the nomenclature of MASLD. Said findings could have important implications for the diagnosis and management of these diseases in similar clinical contexts.

## CRediT author statement

BAPP: conceptualization, investigation, and writing of the original draft. RBR: reviewing, editing, supervision. MEIC: reviewing and editing. SEMR: reviewing and editing. JMRT: reviewing, editing and supervision. All authors reviewed and/or edited the final version of the manuscript.

## Statement on the use of generative AI and AI-assisted technologies

The authors declare that no artificial intelligence was utilized at any stage of the writing or investigation process or in the data analysis.

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## Conflict of interest

The authors declare that there is no conflict of interest.

## Data availability

The data supporting the findings of this study are available upon reasonable request from the corresponding author, B.A. Priego-Parra.

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