PREVALENCE AND RISK FACTORS OF LIVER FIBROSIS IN A REAL-WORLD COHORT: DATA FROM THE GERMAN SLD-REGISTRY

Maurice Michel[1]✉, Andreas Geier[2], Stefan Zeuzem[3], Manfred von der Ohe[4], Münevver Demir[5], Renate Heyne[6], Stephan Grunwald[7], Jens U. Marquardt[8], Yestle Kim[9], Hardo Fischer[10], Melinda Daumont[11], Thomas Berg[12], Elke Roeb[13], Wolf Peter Hofmann[14,15], Jörn Schattenberg[1,16]

[1]Department of Internal Medicine II at the Saarland University Medical Center, Homburg, Germany; [2]Division of Infectious Diseases, Department of Internal Medicine II, University of Würzburg Medical Center, Würzburg, Germany; [3]Goethe University Hospital, Frankfurt, Germany; [4]Gastroenterologische Studiengesellschaft Herne, Herne, Germany; [5]Department of Hepatology and Gastroenterology, Campus Virchow-Klinikum and Campus Charité Mitte, Charité - Universitätsmedizin Berlin, Berlin, Germany; [6]Leberzentrum Checkpoint, Berlin, Germany; [7]Zentrum für Infektiologie Berlin/Prenzlauer Berg, Berlin, Germany; [8]Department of Medicine I, University Hospital Schleswig-Holstein, Lübeck, Germany; [9]Madrigal Pharmaceuticals, Inc., West Conshohocken, Pennsylvania, USA; [10]Madrigal Pharmaceuticals GmbH, Munich, Germany; [11]Madrigal Pharmaceuticals GmbH, Zug, Switzerland; [12]Division of Hepatology, Department of Medicine II, Leipzig University Medical Center, Leipzig, Germany; [13]Department of Gastroenterology, Medical Clinic II, Justus Liebig University, Giessen, Germany; [14]Gastroenterologie am Bayerischen Platz, Berlin, Germany; [15]Leberstiftungs-GmbH Deutschland, Hannover, Germany; [16]University Medical Center of the Johannes Gutenberg University Mainz, Mainz, Germany

OBJECTIVES

Metabolic dysfunction-associated steatotic liver disease (MASLD) is the most common chronic liver disease in Germany. Liver fibrosis related to its inflammatory form, metabolic dysfunction-associated steatohepatitis (MASH), is associated with worse outcomes and increased mortality. Only recently, resmetirom, a THR-beta (THR-β) agonist, received conditional approval by EMA for patients with MASH and fibrosis. Due to the invasive nature of liver biopsies, non-invasive tests (NITs) are often used in routine clinical practice to measure fibrosis. Understanding real-world patient characteristics using NITs may be useful to understand eligibility criteria for this treatment. Given the lack of data on the natural history of MASH in Germany, this analysis therefore aims to describe the prevalence and risk factors of liver fibrosis related to MASLD using NITs in Germany.

METHODS

The German SLD-Registry is a prospective, non-interventional registry study that recruited patients in secondary and tertiary care. As of June 18, 2025, the cohort included 1,508 patients at baseline followed up to 3 years. Fibrosis was assessed by liver stiffness measurement (LSM) using vibration-controlled transient elastography (VCTE) and categorized in strata: 8.5–12 kPa, >12–15 kPa, and >15 kPa (based on inputs from expert clinicians).

A subgroup analysis (n=360) was conducted in patients with baseline VCTE 8.50-<15 kPa or VCTE ≥15-20 kPa and platelets ≥140 x10^9/L representing a treatment eligible MASH cohort. This cohort represented similar inclusion criteria to patients in the MAESTRO-NASH phase 3 trial[1].

Demographic and clinical characteristics, as well as cardiometabolic risk factors were analyzed.

RESULTS

Overall study cohort

The overall study cohort (n=1,508) included 50% males, 60% >100kg, and 63% with obesity (BMI >30 kg/m²). More than 33% of the patients had a liver stiffness >15 kPa at baseline.

Treatment eligible MASH cohort

In the present sub-cohort (n=360), 47% were male, mean age was 54.1 (±12.9) years and 97% of the patients were of Caucasian ethnicity. Characteristics of patients stratified by body weight (45% (163/360) <100 kg vs. 55% (197/360) ≥100 kg are given in Table 1.

Table 1: Characteristics of the treatment eligible MASH cohort stratified by body weight

	Treatment eligible MASH cohort N = 360		
Variable	**< 100 kg N = 163**	**≥ 100 kg N = 197**	**p-value**
BMI (kg/m²)	29.7 ± 4.1	42.2 ± 8.7	< 0.001[1]
BMI>30 kg/m²	41.7 (68/163)	97.5 (192/197)	< 0.001[2]
Liver stiffness (kPa)	11.5 ± 2.4	11.9 ± 2.9	0.118[1]
Liver stiffness ranges			0.296[2]
8.5-12 kPa	64.8 (103/159)	64.2 (124/193)	
>12-15 kPa	25.2 (40/159)	20.7 (40/193)	
>15 kPa	10.1 (16/159)	15.0 (29/193)	
CAP (dB/m)	302.5 ± 44.1	343.6 ± 48.1	< 0.001[1]
FIB-4	1.8 ± 1.3	1.4 ± 1.2	< 0.001[1]
ALT (U/l)	62.0 ± 34.1	55.2 ± 47.4	0.117[1]
AST (U/l)	48.7 ± 24.2	40.2 ± 22.9	< 0.001[1]
GGT (U/l)	132.5 ± 208.2	98.7 ± 125.4	0.071[1]
Platelets (x10^9/L)	230.3 ± 71.1	252.9 ± 77.4	0.004[1]
HbA1c (%)	6.9 ± 0.9	7.2 ± 1.3	0.136[1]
Triglycerides (mg/dl)	200.6 ± 112.9	219.9 ± 324.0	0.607[1]
LDL (mg/dl)	112.0 ± 43.5	104.7 ± 36.1	0.155[1]
HDL (mg/dl)	45.4 ± 9.9	44.9 ± 11.6	0.776[1]
Type 2 DM	83/161 (51.6)	105/197 (53.3)	0.824[2]
Hypertension	101/163 (62.0)	137/197 (69.5)	0.161[2]
Dyslipidemia	88/105 (83.8)	114/148 (77.0)	0.244[2]
Hypothyroidism	36/142 (25.4)	30/173 (17.3)	0.110[2]

Categorical values are shown as % (n/N). Continuous variables are shown as mean ± standard deviation.
ALT, Alanine aminotransferase; AST, Aspartate aminotransferase; BMI, body mass index; CAP, controlled attenuation parameter; DM, diabetes mellitus; FIB-4, Fibrosis-4 index; GGT, γ-Glutamyltransferase; HbA1c, glycated hemoglobin; HDL, high-density lipoprotein; LDL, low-density lipoprotein cholesterol; VCTE; vibration-controlled transient elastography.
[1]Two-Sample-t-test; [2]χ^2-Test

RESULTS cont.

In about two-thirds of the patients, liver stiffness ranged between 8.5 and 12 kPa. In patients with Type 2 DM, the proportion of patients with liver stiffness >12-15 kPa and >15 kPa, respectively, was significantly higher than in patients without Type 2 DM (p<0.001).

Comedications of patients with different comorbidities are provided in Table 2 – the cohorts are not mutually exclusive to one another.

Table 2: Comedication of patients stratified by comorbidity (treatment eligible MASH cohort)

	Treatment eligible MASH cohort (N=360)			
	Comorbidity			
Comedication	**Type 2 DM N = 188**	**Hypertension N = 237**	**Dislipidemia N = 202**	**Obesity (BMI >30 kg/m²) N = 260**
GLP1-RA	28.9 (54/187)	21.6 (51/235)	16.3 (33/202)	15.7 (40/255)
SGLT2-I	26.9 (50/186)	18.4 (43/234)	15.8 (32/202)	19.5 (50/257)
Metformin	71.7 (134/187)	21.6 (111/235)	41.6 (84/202)	43.6 (112/257)
Insulin	25.4 (47/185)	17.1 (40/233)	15.3 (31/202)	15.7 (40/255)
Gliptin	17.7 (33/186)	12.8 (30/234)	10.4 (21/202)	9.8 (25/256)
Statins	46.8 (87/186)	38.7 (91/235)	30.2 (61/202)	31.9 (82/257)
Fibrates	0.5 (1/186)	0.9 (2/233)	1.0 (2/202)	0.8 (2/255)
ACE inhibitors	31.4 (58/185)	34.0 (80/235)	25.7 (52/202)	27.3 (70/256)
AT-1 receptor agonists	34.8 (65/187)	42.6 (100/235)	26.2 (53/202)	31.5 (81/257)
Ca antagonists	28.9 (54/187)	34.7 (82/236)	24.8 (50/202)	27.9 (72/258)
other antihypertonics	11.3 (21/186)	12.4 (29/234)	8.4 (17/202)	9.0 (23/256)

Categorical values are shown as % (n/N). ACE, angiotensin-converting enzyme; AT1, angiotensin II type 1; Ca, calcium; DM, diabetes mellitus; GLP1-RA, Glucagon-like peptide-1 receptor agonists; SGLT2-I, Sodium-glucose transport protein 2 inhibitors

Table 3: Course and increase in liver stiffness up to year 3 after baseline (treatment eligible MASH cohort)

		Treatment eligible MASH cohort
Year	**Liver stiffness**	**N = 352**
Course		
Year 0 (Baseline)	8.5-12 kPa	64.5 (227/352)
	>12-15 kPa	22.7 (80/352)
	>15 kPa	12.8 (45/352)
Year 1	8.5-12 kPa	61.6 (45/73)
	>12-15 kPa	17.8 (13/73)
	>15 kPa	20.5 (15/73)
Year 2	8.5-12 kPa	45.2 (14/31)
	>12-15 kPa	16.1 (5/31)
	>15 kPa	38.7 (12/31)
Year 3	8.5-12 kPa	36.8 (7/19)
	>12-15 kPa	36.8 (7/19)
	>15 kPa	26.3 (5/19)
Increase vs. BL		
Year 1	no change	79.5 (58/73)
	>12-15 kPa	6.8 (5/73)
	>15 kPa	13.7 (10/73)
Year 2	no change	80.6 (25/31)
	>12-15 kPa	3.2 (1/31)
	>15 kPa	16.1 (5/31)
Year 3	no change	73.7 (14/19)
	>12-15 kPa	21.1 (4/19)
	>15 kPa	5.3 (1/19)

Categorical values are shown as % (n/N). BL, Baseline.

Table 3 shows 352 of 360 patients with kPa values reported at baseline, of which 45 (12.8%) had >15kPa. At year 3, among the 19 patients who had kPa values reported, there was an even distribution across the LSM strata.

Looking at changes of LSM over time: at year 3, one of the 19 (5.3%) patients who had kPa values reported, had increased levels of LSM of over 15kPa compared to baseline, indicating that four patients with >15kPa at year 3 remained stable from baseline.

CONCLUSIONS

The burden of fibrosis and cardiometabolic risk factors is high in patients with MASLD in Germany. Identifying those with moderate to advanced fibrosis using NITs may help determine those who may be eligible for future MASH-specific pharmacotherapies to improve outcomes.

Data were derived from the **German SLD-Registry** (Deutsches SLD-Register), a project of the German Liver Foundation (Deutsche Leberstiftung), managed by Leberstiftungs-GmbH Deutschland.

Principal Investigator: Stefan Zeuzem, Frankfurt am Main

Management Board: Thomas Berg, Peter Buggisch, Andreas Geier, Wolf Peter Hofmann, Münevver Demir, Elke Roeb, Jörn Schattenberg, Kerstin Stein, Heiner Wedemeyer.

The German SLD-Registry is financially supported by Advanz Pharma Specialty Medicine Deutschland GmbH/Intercept Pharma Europe Ltd. and Gilead Sciences GmbH (grants to Deutsche Leberstiftung) as well as Madrigal Pharmaceuticals, Inc. and Novo Nordisk Pharma GmbH (directly via Leberstiftungs-GmbH).

Contact

Leberstiftungs-GmbH Deutschland
Carl-Neuberg-Str. 1
30625 Hannover
info@leberstiftungs-gmbh.de

✉Maurice.Michel@uks.eu

References

[1]Harrison et al. N Engl J Med 2024;390:497-509. DOI: 10.1056/NEJMoa2309000