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Metabolic liver disease in N'Djamena: Clinical and elastometric manifestations and associated factors

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Abstract

Introduction: Metabolic liver disease (MASLD) is a common condition characterised by the accumulation of fat in liver cells, which can lead to cirrhosis. The aim of this study was to describe the clinical and paraclinical manifestations and associated factors of hepatic steatosis in N'Djamena.

Patients and methods: This was a descriptive cross-sectional study with prospective data collection over a period of two years. The study was conducted in the Gastroenterology Department of the Centre Hospitalier Universitaire la Reference Nationale (CHU-RN). Patients with risk factors for metabolic syndrome who had undergone a Fibroscan (CAP) were included. The variables studied were sociodemographic, clinical and paraclinical.

Results: A total of 253 patients were included. The mean age was 44.8 ± 9.4 years, with extremes of 12 and 70 years. There was a predominance of males (60.9%). The sex ratio was 1.55. Civil servants accounted for 49%. The main risk factor was diabetes (45.5%). Overweight and obesity accounted for 81.8%. In this series, BMI was significantly associated with hepatic steatosis (p=0.001). Laboratory tests revealed dyslipidaemia (hypertriglyceridaemia and/or hyper HDL cholesterol) in 58.5% of cases. Transaminases (ALT) were normal in 78.3% of cases. Nearly 20% of patients were carriers of the hepatitis B virus. The prevalence of hepatic steatosis diagnosed by ultrasound was 48.6% and that diagnosed by Fibroscan was 83.0%. There was a significant association between FIBROSCAN CAP values and steatosis detected by ultrasound, with a p-value <0.001. More than 38% (n=97) were at stage 2 steatosis and 15.4% (n=39) at stage 3.

Conclusion: Hepatic steatosis is increasingly common in our context. FIBROSCAN® with CAP has good diagnostic performance for its assessment.

Keywords: Steatosis; Liver; Metabolic syndrome; FIBROSCAN®; CHU-RN; N'Djamena.

1. Introduction

Metabolic liver disease (MASH), formerly known as non-alcoholic steatohepatitis (NASH), is a condition characterised by lipid accumulation causing inflammation and liver cell damage, which can lead to cirrhosis [1,2].

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It is the second leading cause of end-stage liver disease and primary liver cancer in Europe [1]. The main risk factors are obesity, dyslipidaemia, type 2 diabetes and metabolic syndrome [1,2,3]. According to several authors, hepatic steatopathy is a component of metabolic syndrome [4,5].

Due to the global obesity epidemic, MAFLD, formerly known as NAFLD, has become the leading cause of chronic liver disease [6]. The overall prevalence of MAFLD is estimated at 25.2% of the population, and 23.7% in Europe [7]. The prevalence in France was 18%, or 8.5 million people [7]. Countries in the Middle East and South America have the highest rates (30%).

Africa has a low prevalence (13.5%), which varies from one country to another [8].

In Mali, NAFLD was found in 4.97% of abdominal ultrasounds [9]. In Burundi, ultrasonographic hepatic steatosis accounted for 37.2% [10].

In Chad, very little data is available on hepatic steatosis.

Hence the interest of this study, which aims to determine the prevalence of hepatic steatosis and evaluate the clinical and paraclinical manifestations as well as the **associated factors.**

2. Patients and methods

This was a descriptive cross-sectional study with prospective data collection over a period of two years (April 2023 to March 2025).

The Internal Medicine/Hepatology-Gastroenterology Department of the CHU-RN in N'Djamena served as the study setting. The study population consisted of patients with risk factors for metabolic liver disease (diabetes, obesity, hypertension, dyslipidaemia on laboratory tests, hepatic steatosis on ultrasound).

Patients with hepatic steatosis on Fibroscan (CAP) were included.

Data were collected using a pre-established survey form and included sociodemographic, clinical and paraclinical variables, personal and/or family history of hypertension (HT), diabetes (particularly type 2), and cardiovascular disease, which are major risk factors.

Other risk factors investigated were: tobacco and alcohol consumption, assessed in pack-years for tobacco and in g/day for alcohol. Alcohol consumption exceeding 30 g/day for men and 20 g/day for women was considered a risk factor for steatosis. This measurement applied to industrially produced alcohol and not to local beer. In practical terms, height was measured in centimetres (cm) using a height gauge with patients barefoot. Weight was measured in kilograms (kg) in lightly clothed and barefoot patients using a weighing scale. The body mass index or BMI value in kg/m^2 was obtained by dividing weight by the square of height. According to BMI, patients were classified as underweight if < 18.5; normal weight between 18.5 and 25; overweight between 25 and 30; grade I obese between 30 and 35; grade II obese between 35 and 40; and grade III obese if > 40. Waist circumference was measured with a tape measure in centimetres at the narrowest part of the abdomen above the navel. Blood pressure was measured in millimetres of mercury (mm Hg) on both arms after resting for at least 10 minutes (min), and the average of the two readings was recorded. Blood pressure was considered high (hypertension) if the systolic pressure was > 140 mmHg and/or the diastolic pressure was > 90 mmHg. The biological tests prescribed were: alanine aminotransferase or ALAT (normal if < 40 units per litre (IU/l) in men and < 31 IU/l in women); aspartate aminotransferase or ASAT (normal if < 45 units per litre (IU/l) in men and < 31 IU/l in women) . Total cholesterol levels: HDL, low if < 40 milligrams per decilitre (mg/dl) or < 1 millimole per litre (mmol/l) for men and < 50 mg/dl or <1.3 mmol/L for women; LDL, high if >200 mg/dl or >2 mmol/L; triglycerides (TG), high if >150 mg/dl or >1.7 mmol/L for both sexes. Fasting blood glucose, high if ≥ 110 mg/dl or ≥ 5.6 mmol/L, glycated haemoglobin or HbA1c, high if ≥ 7%. Gamma-glutamyl transpeptidase (GGT); uric acid; complete blood count (CBC); creatinine; serology for viral hepatitis B and C: anti-HBc antibodies were requested. A positive hepatitis C serology should be confirmed by viral load (HCV RNA).

The Fibroscan registry helped us recall certain patients with incomplete information. The diagnosis of steatosis was confirmed by a Fibroscan 530.

Equipped with two probes (XL and L), this is a non-invasive test that assesses liver fibrosis and steatosis. All patients fasted for three hours before the test.

Data was entered using WORD 2013 and EXCEL software, then transferred to SPSS software for analysis.

3. Results

During this study, 253 patients were included out of a total of 1,855 who underwent a Fibroscan examination (CAP), i.e. 13.64%.

3.1. Sociodemographic characteristics

The average age of patients was 44.8 ± 9.4 years, ranging from 12 to 70 years.

Men accounted for 60.9% (n=154) and women for 39.1% (n=99). The sex ratio was 1.55. In terms of educational level, 59.7% (n=151) had a higher education level.

In terms of occupation, 49% of our patients (n=124) were civil servants and 17.4% were traders.

Table 1 Sociodemographic characteristics of patients

Socio-demographic characteristics	**n**	**%**
Age group (years)		
[15-35]	48	19
]35-55]	161	63,6
]55-70]	44	17,4
Gender		
Male	154	60,9
Female	99	39,1
Level of education		
Higher	151	59,7
Secondary	30	11,9
Primary	27	10,7
None	45	17,8

3.2. Background and risk factors

In this series, 50 patients were carriers of hepatitis B virus (19.8%) and two were infected with HIV (0.79%). No cases of hepatitis C were detected.

However, in terms of risk factors, 115 of the patients were diabetic (45.5%). Overweight and obesity accounted for 81.8% (n=207), including one patient with grade III obesity. Seven (2.8%) patients were known to be hypertensive and were being monitored by a cardiologist. Fifty-five of our patients (21.7%) reported smoking, seven of whom had an estimated consumption of two packets per year. One hundred and two (102) patients consumed alcohol occasionally, but this could not be quantified.

In our study, BMI was significantly associated with hepatic steatosis (p=0.001). Biological tests revealed dyslipidaemia (hypertriglyceridaemia and/or low HDL cholesterol) in 58.5% of patients. Transaminases, particularly ALT, were normal in 198 patients (78.3%). GGT and PAL tests were only performed in 112 patients, 89 of whom had normal results (79.5%).

Clinically, most of the patients included were asymptomatic. The reason for consultation was the incidental discovery of fatty liver on ultrasound, cytolysis or a positive viral hepatitis screening test (HBV or HCV). However, thirteen patients had consulted for abdominal pain, representing 5.1%.

On elastography, 117 patients (46.2%) had stage I steatosis, 97/253 (38.3%) were classified as stage II, and 39 patients (15.4%) were classified as stage III.

Correlation between steatosis on ultrasound and Fibroscan

Table 2 Correlation between diagnosis of steatosis on ultrasound and Fibroscan

	Number	**Percentage**	**95% CI**
Steatosis on Fibroscan			
No	43	17,0	[0,128 ; 0,221]
Yes	210	83,0	[0,778 ; 0,871]
Steatosis on ultrasound			
No	130	51,4	[0,452 ; 0,575]
Yes	123	48,6	[0,424 ; 0,547]

A significant association was found between the diagnosis of steatosis on ultrasound and CAP values on Fibroscan with $p< 0.001$.

4. Discussion

Out of a total of 1,855 patients who underwent Fibroscan, 253 had hepatic steatosis, i.e. 13.64%. In Burkina Faso, a prevalence of 15.74% was reported in patients with metabolic syndrome [11]. This result is also similar to other African studies, particularly those conducted in Nigeria (12.1%) and Ethiopia (12.5%) [12]. However, it is below the prevalence reported in the Middle East and South America (30%) and Africa [8].

Men represent 60.9% of this population, with a sex ratio of 1.5. Our results are similar to those of Ahn et al. in Seoul in 2016 [13]. However, they differ from those of Compaoré in 2021 in Burkina Faso and Abodo in Côte d'Ivoire in 2022, which reported a female predominance [14,15]. They also differ from those of Nômawendé et al., who also reported a female predominance of 57.04% [11]. However, the male predominance in our study could be explained by the fact that MAFLD follows an «inverted U» curve in men, with prevalence increasing in younger individuals and those of middle age, then gradually decreasing after the age of 50.

The average age of our patients is 44.8 ±9.4 years, with the majority under the age of 60. Our results are similar to those of Compaoré in Burkina Faso in 2021 and Abodo in Ivory Coast in 2022, who found a median age of 44.69 years and 51 years, respectively [14,15]. Our results are also comparable to data in the literature. Indeed, the average age of diagnosis for MAFLD is between 40 and 50 years [16,17]. In our context, men are prone to certain dietary habits such as alcohol consumption.

By occupation, civil servants (49.0%) and traders (17.4%) are strongly represented. Most of these civil servants have a higher education level. These results are similar to those of Compaoré et al. [14], who reported rates of 42.14% and 27.46% for public and/or private sector workers and traders, respectively. This predominance of civil servants and traders can be explained by the cost of the tests required in the inclusion criteria. In fact, only patients who had undergone at least one abdominal ultrasound and elastometry, not to mention lipid testing, were included in this study. The cost of these tests is only affordable to people with a certain level of financial means (average level). Hepatic steatosis in these occupational categories could also be explained by the sedentary nature of this environment.

In terms of medical history (risk factors), diabetes accounts for 45.5%. Overweight and obesity are found in 81.8% of patients in this category. With regard to diabetes, our results are lower than those reported by Compaoré in Burkina Faso and Ntagirabiri in Burundi, who reported 49.30% and 72.1% [14,10]. The role of obesity, especially visceral obesity, is well known. It is probably linked to a diet rich in fats and sugars that are rapidly absorbed and aggravated by a sedentary lifestyle [18,19, 20]. Dyslipidaemia is found in 58.5% of this series. This result is similar to those of Younossi, Musso and Tarantino, who reported high levels of total cholesterol, HDL cholesterol and LDL cholesterol in 40-60% of patients with NAFLD [21,22,23]. Fabbrini found hypertriglyceridaemia in 30-50% of patients [21].

Nearly 20% of the study population (19.8%) are carriers of the hepatitis B virus and 0.8% (n=2) are infected with HIV. Although HBV prevalence is high in this series, it is lower than in the Burkinabe series, which found that 36.50% of patients were HBV carriers [24]. The high proportion of patients carrying the hepatitis B virus is consistent with data in the literature. Sub-Saharan Africa is located in an area of high HBV endemicity, with an estimated prevalence of 8% in West Africa and 5-7% in Central, East and Southern Africa [25]. The literature establishes a link between steatosis and viral hepatitis C, but we did not find any patients with hepatitis C in our series.

Transaminases, particularly ALT, were normal in 198 patients (78.3%) in our study. This result is similar to those reported by Compaoré et al., who found normal transaminase levels in 73.9% of patients [11]. Indeed, according to the literature, there is very little correlation between transaminase levels and the severity of liver disease [18]. The degree of inflammation and fibrosis are thought to be prognostic factors for liver damage [26,27].

Diagnostic correlation between ultrasound and FIBROSCAN®

Our study found a prevalence of hepatic steatosis diagnosed by ultrasound of 48.6% with a 95% CI [0.424; 0.547]; and that diagnosed by FIBROSCAN® was 83.0% with a 95% CI [0.778; 0.871].

There was a correlation between CAP values and steatosis detected by ultrasound with a p-value < 0.001. The higher the CAP values (S≥2), the more steatosis was detectable by ultrasound.

5. Conclusion

Hepatic steatosis, which is underestimated compared to its 'alter ego' viral hepatitis, is common in N'Djamena. The main risk factor is metabolic syndrome, given the change in lifestyle in our context.

Therefore, a policy of healthy eating and awareness-raising for behavioural change, particularly the fight against sedentary lifestyles, is more necessary than ever.

Compliance with ethical standards

Disclosure of conflict of interest

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Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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