PREVALENCE OF NAFLD IN THE GULF OF SIDRA, LIBYA

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Abstract: Currently the most common chronic liver condition, non-alcoholic fatty liver disease (NAFLD) is a major global health concern. Despite its rising global incidence, epidemiological data regarding NAFLD prevalence in Libya remain scarce. This cross-sectional study aimed to determine the prevalence of NAFLD among adults in Libya and evaluate its distribution across different age groups and genders. The study involved 200 participants of varying ages and genders recruited from a regional health center. Abdominal ultrasound was employed to screen for signs of fatty liver disease, and the collected data were analyzed using SPSS version 26. The results revealed higher prevalence of NAFLD in women (60.5%) compared to men (39.5%), with the highest prevalence rates observed in individuals aged 40 to 69 years. These findings indicate that NAFLD is becoming increasingly common both globally and within the local community. Consequently, there is an urgent need for enhanced awareness programs and effective management strategies at local, regional, and global levels to address this growing public health concern.
Keywords: Nonalcoholic fatty liver disease (NAFLD), metabolic dysfunction–associated steatotic liver disease (MASLD), hepatic steatosis, ultrasonography, prevalence.
Keywords: Computed tomography; Pulmonary embolism; Sensitivity

1. Introduction

Fatty liver disease (FLD), also known as steatotic liver disease (SLD) which is characterized by more fat accumulation in hepatocytes. When amount of fat more than 5–10% of the liver's weight, then it becomes steatotic liver disease (SLD). Nonalcoholic fatty liver disease (NAFLD) is a major cause of chronic liver disease worldwide and strongly associated with metabolic risk factors like obesity, diabetes mellitus, hypertension, and dyslipidemia (Rinella, 2015; Chalasani et al., 2018).

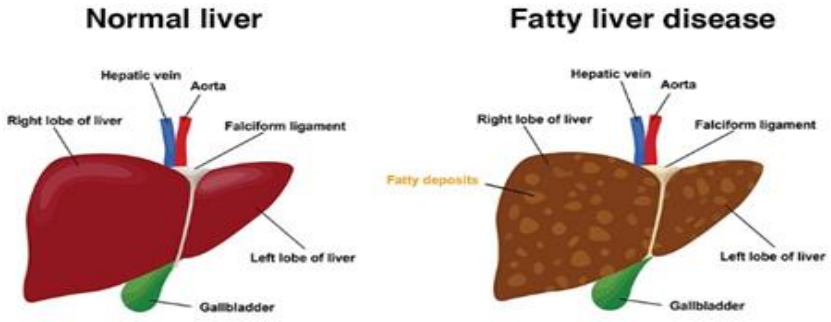


Figure 1. Normal liver compared to fatty liver showing fat accumulation in hepatocytes

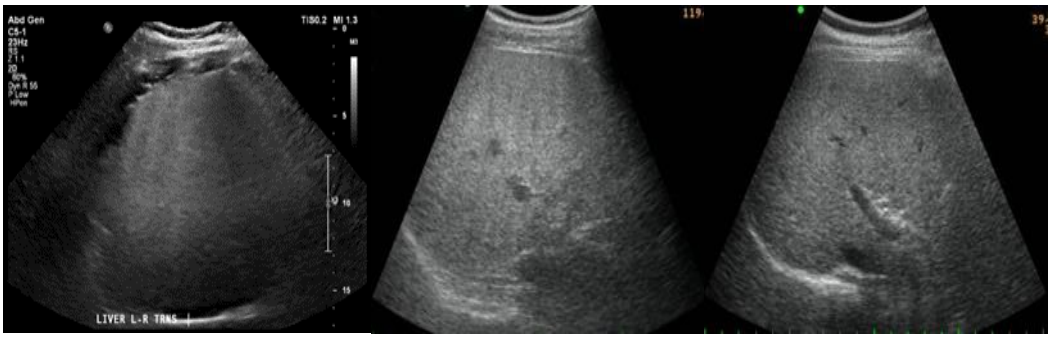
Historically, fatty liver disease was divided into alcoholic fatty liver disease (AFLD) and non-alcoholic fatty liver disease (NAFLD). More recently, advances have led to a redefinition of the disease as metabolic dysfunction–associated steatotic liver disease (MASLD), showing its metabolic origin and clinical relevance (Eslam et al., 2020). This updated nomenclature highlights the strong association between fatty liver disease and metabolic syndrome. Globally, NAFLD affects approximately 30–40% of the adult population, with increasing prevalence reported through multiple regions, specific in the Middle East and North Africa (MENA) region (Younossi et al., 2023; Quek et al., 2023). Numerous studies have shown that the disease's onset and progression are significantly influenced by lifestyle factors, such as obesity, bad eating habits, and sedentary behavior. For instance, Ye et al. (2025) reported a prevalence of 34.1% in the United States, while López-Velázquez et al. (2014) emphasized the strong relationship between NAFLD and rising obesity rates. Furthermore, Dong et al. (2024) highlighted the increasing global burden of NAFLD and projected a continued rise in prevalence over the coming decades. In the Arab region, NAFLD prevalence has been reported to exceed 40% in several countries, largely driven by increasing rates of obesity and diabetes (Almansoury et al., 2023). Despite this, epidemiological data from Libya remain limited. Previous local studies, such as Aljadi et al. (2020), have primarily focused on specific patient populations, particularly individuals with type 2 diabetes, leaving a significant gap in understanding the prevalence of NAFLD in the general population.

Ultrasound imaging is widely used as a first-line, non-invasive diagnostic tool for detecting fatty liver disease due to its accessibility, safety, and cost-effectiveness. It enables the assessment of hepatic echogenicity and classification of disease severity into Grades I, II, and III based on established sonographic criteria (Bell & Gaillard, 2025; Hernaez et al., 2011):

Grade I: Diffusely increased hepatic echogenicity with normal periportal and diaphragmatic echogenicity and normal vascular visibility.

Grade II: Also diffusely increased hepatic echogenicity leading to loss periportal echogenicity with preserved diaphragmatic echogenicity and little reduced vascular visibility.

Grade III: Significantly elevated hepatic echogenicity with poor vascular visualization that obscures periportal and diaphragmatic echogenicity.



G1 fatty liver **G2 fatty liver** **G3 fatty liver**

Figure 2. Distribution of fatty liver grades (G1, G2, G3)

Despite the growing global and regional burden of NAFLD, there is a lack of comprehensive data regarding its prevalence and demographic distribution within the Libyan population, particularly in the Gulf of Sidra region. Therefore, this research aims to determine the prevalence of NAFLD using ultrasound among patients in this region and to evaluate its distribution according to age, gender, and disease severity. This study provides baseline epidemiological data that may support future healthcare planning and preventive strategies in Libya.

2. Research Method

This study used a cross-sectional descriptive retrospective to assess the prevalence and clinico-demographic characteristics of fatty liver disease. The study was conducted at General Ben Jawad Hospital (GBJH) in the Gulf of Sidra region, Libya, during the year 2023. The study included all patients undergoing abdominal ultrasound examination at the radiology department of General Ben Jawad Hospital during the research period. Out of 1,266 individuals who had abdominal ultrasounds through one year, 200 patients with fatty liver disease were included in the study. Patients were evaluated regardless of gender, and age distribution was analyzed to determine demographic associations.

2.1 Criteria for inclusion

i. Individuals with fatty liver disease identified with abdominal ultrasonography;
ii. Age ≥ 18 years; and
iii. Patients with complete ultrasound records.

2.2 Criteria for exclusion

i. Patients with viral hepatitis;
ii. Patients with liver cirrhosis of other etiologies;
iii. Patients with significant alcohol consumption; and
iv. Incomplete medical records.

2.3 Ultrasonographic Assessment

All patients underwent abdominal ultrasound examination using a Philips HD5 sonographic system (2.5–6) MHz with standard convex transducer by a senior radiologist (HB) to ensure diagnostic consistency. The following established sonographic criteria were used to diagnose fatty liver:

1. Hepatic echogenicity is higher than that of the renal cortex
2. Poor visualization of intrahepatic vascular structures
3. Posterior beam attenuation

Fatty liver severity was graded as:
Grade I: Slight increase in hepatic echogenicity with normal diaphragm and intrahepatic vessels
Grade II: Moderate increase in hepatic echogenicity with poorly visualized vascular structures
Grade III: Significant increase in echogenicity with poorly visualized of diaphragm and vessels

2.4 Ethical Considerations

The administration of Ben Jawad General Hospital approved for this study, and all data collected were anonymized to ensure patient confidentiality. No personal identifiers were used in the analysis. All acquired data was anonymized to ensure patient anonymity, and no personal identifiers were included in the study.

3. Statistical Analysis

IBM SPSS Statistics (Version 26) was utilized to analyze the data, and descriptive statistics were used to summarize the data. Categorical variables were displayed as frequencies and percentages, while continuous variables were expressed as mean ± standard deviation (Mean ± SD). The data was summarized using descriptive statistics. While categorical data were displayed as frequencies and percentages, continuous variables were portrayed as mean ± standard deviation (Mean ± SD).

4. Results and Discussion

Out of 1,266 individuals who underwent abdominal ultrasound examination, 200 cases (15.79%) were diagnosed with nonalcoholic fatty liver disease (NAFLD). This prevalence is lower than global estimates, which range between 30% and 40%, but remains significant within the local context (Younossi et al., 2023; Quek et al., 2023). Age-wise analysis revealed that NAFLD prevalence increased with age, peaking in the 40–49 (24.5%) and 50–59 (24.0%) age groups, followed closely by the 60–69 group (23.5%) (Younossi et al., 2023). Lower prevalence was observed among younger individuals aged 20–29 (7%) and 30–39 (12%). These results are in line with earlier research showing that cumulative exposure to risk factors and age-related metabolic alterations are substantially linked to NAFLD (Younossi et al., 2023). Table 1 presents the demographic distribution of NAFLD cases by age groups. The majority of cases (approximately 72%) were observed in individuals aged 40–69 years, highlighting this group as the most affected population.

Table 1. Demographic distribution of NAFLD cases by age groups

Age groups	Number of cases	Percentage from all cases	Percentage of fatty liver cases
≥20-29	14	1.10%	7%
30-39	24	1.89%	12%
40-49	49	3.87%	24.50%
50-59	48	3.79%	24%
60-69	47	3.71%	23.50%
70-79	14	1.10%	7%
80-89	4	0.31%	2%

Table (2) illustrates the age-wise distribution of NAFLD cases, clearly demonstrating a peak in middle-aged adults. Regarding gender distribution, females represented 60.5% of cases, whereas males accounted for 39.5%. Although several international studies report higher prevalence among males, regional studies in the Middle East and North Africa have demonstrated similar patterns with increased prevalence among females, possibly due to lifestyle factors and hormonal influences (Almansoury et al., 2023).

Table 2. Distribution of NAFLD cases by gender

Gender	Number	Percentage %
Male	79	39.5%
Female	121	60.5%
Total number	200	100%

Ultrasound grading indicated that the majority of patients (94.5%) had Grade I fatty liver, while 5.5% were classified as Grade II, and no Grade III cases were identified (Table 3). This predominance of mild steatosis suggests early-stage detection and supports the use of ultrasound as an effective, non-invasive screening modality (Hernaez et al., 2011).

Table 3. Distribution of fatty liver grades on ultrasonographic examination among affected individuals

Grades	G1 Fatty liver	G2 Fatty liver	G3 Fatty liver
Number of cases affected by NAFLD	189	11	0
Percentage %	94.5%	5.5%	0%

The findings of this study are consistent with global trends indicating an increasing burden of NAFLD worldwide, largely driven by obesity, sedentary lifestyle, and metabolic syndrome (Quek et al., 2023; Dong et al., 2024). However, the relatively lower prevalence observed in this study may be attributed to regional variations and sample characteristics. There are several limitations to this study, including the lack of clinical and biochemical parameters like lipid profile, body mass index (BMI), and glycemic status, which restricts the ability to evaluate related risk factors. Additionally, the single-center design may limit the generalizability of the results. It is difficult to evaluate related risk variables because clinical and biochemical measures, such as body mass index (BMI), lipid profile, and glycemic status, were excluded. Furthermore, the results may not be as broadly applicable due to the single-center design. Overall, this study highlights the increasing prevalence of NAFLD in the Gulf of Sidra region, particularly among middle-aged adults and females. These findings emphasize the importance of early screening, increased awareness, and preventive healthcare strategies.

5. Conclusion

The results of this study showed that nonalcoholic fatty liver disease (NAFLD) is a significant and expanding public health concern in the Gulf of Sidra region. A higher prevalence was observed among females (60.5%) and individuals aged 40–69 years, indicating that middle-aged adults are the most affected group. The predominance of Grade I steatosis suggests that most cases were detected at an early stage, providing a valuable opportunity for timely intervention and disease prevention. These findings highlight the importance of implementing effective screening strategies and increasing public awareness to reduce the burden of NAFLD. Further large-scale and multicenter studies are recommended to better understand the epidemiology of NAFLD in Libya and to support evidence-based healthcare planning.

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