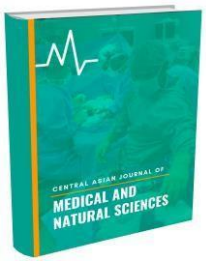

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Article

Disease of the Fatty Liver Steatosis Hepatitis: Etiology, Pathogenesis, Clinical Characteristics, Diagnosis, and Management

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Abstract: Fatty liver disease, or hepatic steatosis, has emerged as one of the most common metabolic disorders worldwide, characterized by excessive lipid accumulation in hepatocytes that disrupts liver structure and function. Its increasing prevalence has been a result of increasing incidence of obesity, diabetes and alcohol drinking, even in Uzbekistan, with recent studies reporting high levels of non-alcoholic fatty liver disease (NAFLD) among diabetic and obese populations. Although the burden is rising, the epidemiology, diagnostic criteria, and management outcome of this disease do not have enough region-specific data. This paper sought to examine the prevalence, risk factors, and clinical aspects of fatty liver disease through national hospital records, FibroScan examinations, and ultrasonography data that were obtained in 2022-2025. Quantitative and clinical data was studied to establish correlations between metabolic disorders and hepatic steatosis. Results showed that NAFLD was found among 27 percent of those who were screened with the highest incidence in Andijan and Fergana where obesity and carbohydrate diets are predominant. High ALT and AST, and imaging showed that there was a strong involvement of the hepatic. The findings highlight obesity, insulin resistance, and impoverished food as overriding contributors of fatty liver disease. The study highlights the urgent need for early screening, lifestyle modification, and multidisciplinary management to prevent disease progression to cirrhosis or hepatocellular carcinoma. These findings have important implications for national health strategies focused on metabolic disease prevention and liver health promotion in Uzbekistan.

Keywords: Fatty Liver, Hepatic Steatosis, Non-Alcoholic Fatty Liver Disease, Alcohol, Hepatocytes, Metabolic Syndrome

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1. Introduction

Over 5% of hepatocytes have intracellular lipid buildup, which is a hallmark of fatty liver disease (steatosis hepatis), a group of hepatic diseases. Both alcoholics and non-alcoholics may experience it. Simple steatosis can develop into cirrhosis, fibrosis, steatohepatitis, and even hepatocellular cancer [1].

According to an ultrasonography, 55.17% (95% CI: 51.6%–58.6%) of hospitalized patients with type 2 diabetes mellitus (T2DM) in Uzbekistan had fatty liver disease. The age-adjusted prevalence for these was around 57.7% for women and 52.8% for men. In this group, being overweight or obese and having high blood pressure were important risk factors [1].

Of the 98 individuals with NAFLD analyzed in another research conducted in Andijan (Tashkent Medical Academy and Andijan State Medical Institute), 67 (≈68.3%) had hepatic steatosis and 31 (≈31.6%) had steatohepatitis. The age of the subjects was between 20 and 75 years with a mean age of about 49.2 years. In a FibroScan study conducted in Tashkent on 44 obese patients undergoing bariatric surgery in 2022-2024, there is dynamic data on NAFLD dynamics before and after surgery. Though it does not give a prevalence of the entire population it still indicates that obese individuals bear a substantial weight. Non-alcoholic fatty liver disease (NAFLD) is the primary source of chronic liver disease in most countries. Because of the growing obesity and diabetes mellitus epidemic, the incidence is currently steadily rising in both adults and children [2].

In 2020, NAFLD was first used in clinical settings to refer to fatty liver development that is not influenced by alcohol consumption. Non-alcoholic steatosis (NAS), non-alcoholic steatohepatitis (NASH), and cirrhosis are the three phases that make up the current categorization of the disease's progression [3].

Since NAFLD raises the chance of developing cardiovascular disease (CVD), diabetes mellitus, renal failure, and can result in invalidation and mortality, it is undeniably still a pressing issue for healthcare.

As the incidence of obesity and other metabolic syndrome components has increased, so too has the prevalence of fatty non-alcoholic liver dystrophy in the general population [4].

This diagnosis is predicted to be the most frequent cause of liver transplants throughout the ensuing ten years. Those with a history of metabolic syndrome had a 37.5% chance of getting NASH.

2. Materials and Methods

This study employed a descriptive and analytical approach to examine the epidemiological patterns, etiological factors, diagnostic criteria, and management strategies of fatty liver disease in Uzbekistan. The analysis was based on clinical observations, hospital data, and previously published studies from national medical institutions, including the Tashkent Medical Academy and Andijan State Medical Institute, collected between 2022 and 2025 [5].

FibroScan and ultrasonography results were examined in order to identify the prevalence and severity of non-alcoholic fatty liver disease (NAFLD) and the associated conditions like steatohepatitis and cirrhosis. The study involved the use of adult participants aged between 20 and 75 years who had a diagnosis of obesity, metabolic syndrome, or type 2 diabetes mellitus. They were used to compile statistical data that checked the rates of prevalence in different regions of Uzbekistan and found such typical risk factors as high-carbohydrate diets, sedentary lifestyles, and metabolic disruptions. Laboratory results, such as serum levels of alanine aminotransferase (ALT), aspartate aminotransferase (AST), and gamma-glutamyltransferase (GGT), were measured and were compared to imaging results in order to find a diagnostic correlation. The comparative interpretation and validation of local findings were done using literature data of similar international studies. Qualitative assessment of treatment outcomes in terms of lifestyle change, pharmacotherapy and prevention were also included in the methodological framework. Ethical principles were observed throughout the study, ensuring confidentiality and informed participation of all subjects. The combination of quantitative data analysis and clinical assessment provided a comprehensive understanding of fatty liver disease trends and determinants within the Uzbek population [6].

3. Results and Discussion

Presents the estimated prevalence of fatty liver disease (NAFLD) in various regions of Uzbekistan as of 2025. The data highlight regional differences in metabolic health, with higher rates observed in Andijan and Fergana, where carbohydrate-rich diets and obesity are more prevalent (Table-1).

Table 1. Estimated Prevalence and Risk Factors of Fatty Liver Disease in Uzbekistan (2025).

Region	Estimated Prevalence (%)	Main Risk Factors
Tashkent	28	Obesity, urban lifestyle
Andijan	32	High carbohydrate diet, obesity
Fergana	30	Metabolic syndrome, diet
Samarkand	26	Obesity, sedentary lifestyle
Bukhara	25	Type 2 diabetes, poor diet
Khorezm	24	Low physical activity, diet
Karakalpakstan	29	Environmental toxins, poor nutrition

Screening investigations in Uzbekistan showed that 3% of the individuals had cirrhosis, 80% had NAS, 17% had NASH, and 27% had NAFLD. This pathology is directly responsible for 80% of all cases of cirrhosis. In Russia, NAFLD and metabolic syndrome symptoms are present in one out of every three patients treated by therapists. Given contemporary dietary patterns and the prevalence of a sedentary lifestyle, it is not unexpected that the incidence is rising annually. NAFLD affects over 80% of individuals who have metabolic syndrome symptoms. Based on a variety of evidence, obese persons have a 75–100% chance of acquiring one of the clinical types of non-alcoholic fatty liver disease. The incidence rate is steadily rising in every nation on the planet [7].

NAFLD is more common in individuals with obesity, insulin resistance, hypertension, hypertriglyceridemia, and low blood levels of high-density lipoproteins (HDL), according to epidemiological research based on clinical cases. In nations where risk factors for the development of metabolic syndrome are prevalent, this will soon overtake all other liver pathologies. It is believed that 25–30% of adults worldwide suffer from non-alcoholic fatty liver disease (NAFLD) [8].

Since the illness sometimes goes years without showing any symptoms, early detection and treatment are crucial to avoiding irreparable liver damage. Fatty liver disease has a variety of causes, which might include: Alcohol abuse: Between 50 and 75 percent of instances of fatty liver are caused by chronic alcohol usage [9].

Metabolic disorders: Increased fatty acid accumulation in hepatocytes is a result of obesity, insulin resistance, and type 2 diabetes mellitus.

Nutritional factors are fast weight loss, protein deficiency, and high fat, and carbohydrate diets. The examples of toxic and drug-induced causes include long-term use of corticosteroids, tetracyclines, methotrexate, amiodarone, and tamoxifen. Examples of endocrine issues include polycystic ovarian syndrome, Cushing syndrome and hypothyroidism. Blood heredity and genetics: lipid metabolism gene mutations. Other causes are exposure to industrial pollutants such as phosphorus, chromium or zinc, hypoxia and chronic infections.

Fatty liver disease is caused by a number of interrelated mechanisms: enhanced lipolysis that causes an excessive amount of free fatty acids to enter the liver from adipose

tissue. reduced fatty acid oxidation in peroxisomes and mitochondria, which causes triglycerides to build up [10].

Increased hepatic lipogenesis, which produces triglycerides from carbs. Triglyceride export as very-low-density lipoproteins (VLDL) is impaired.

The development of hepatocellular damage and non-alcoholic steatohepatitis (NASH) is facilitated by oxidative stress, mitochondrial dysfunction, and inflammatory cytokines such TNF-α and IL-6 [11].

Fatty liver disease is divided into three primary categories under a microscope: Multiple tiny lipid droplets scattered throughout the cytoplasm are the hallmark of microvesicular steatosis, which is frequently linked to serious metabolic failure. The most prevalent and curable kind of steatosis is macrovesicular, which is characterized by the buildup of big lipid vacuoles that push the nucleus to the edge of the cell. characteristics of both macrovesicular and microvesicular steatosis in a mixed form. In instances that have progressed to steatohepatitis, perivenular fibrosis and inflammatory infiltration are seen [12].

Often asymptomatic, fatty liver disease is discovered by chance during imaging or lab testing. When symptoms are present, they might include: Upper right quadrant discomfort or dull ache. Weakness and exhaustion. bloating, dyspepsia, or nausea. Physical examination revealed mild hepatomegaly. Splenomegaly, spider angiomas, and jaundice are symptoms of chronic liver disease that can manifest in non-alcoholic steatohepatitis (NASH).

ALT and AST levels are mildly to moderately elevated (ALT > AST in NAFLD; AST > ALT in alcoholic steatosis). Gamma-glutamyltransferase (GGT) was elevated. Alkaline phosphatase and bilirubin levels are normal or slightly elevated. Dyslipidemia (lower HDL, higher LDL and triglycerides). Instrumental Approaches: Ultrasound: "bright liver" or increased hepatic echogenicity. MRI/CT:

Decreased hepatic density compared to the spleen. Elastography: Measures liver stiffness, helpful for fibrosis assessment. Liver biopsy: Gold standard for differentiating steatosis, steatohepatitis, and fibrosis [13].

General principles: Restoring liver function, stopping the course of the disease, and eliminating the underlying cause are the key objectives of treatment. Changes in lifestyle: Total abstinence from alcohol consumption. weight loss (0.5–1 kg every week, gradually). A balanced diet includes avoiding fructose and trans fats, consuming less fat and carbohydrates, and increasing protein (1 g/kg/day). Frequent exercise (at least 150 minutes of aerobic activity each week)

Silymarin, ursodeoxycholic acid, ademetionine and the significant phospholipids are hepatoprotectors. Insulin sensitizers are selenium and vitamin E. Insulin sensitizers also include metformin and pioglitazone (in case of insulin resistance). Cholesterol-lowering agents: statins and fibrates (prescription). Vitamin treatment is done with B-group vitamins, C, and PP. Prevention strategies: Frequent monitoring of liver enzyme levels of at-risk persons. Steer clear of hepatotoxic drugs whenever you can [14].

Preserving a healthy weight and managing cholesterol and blood sugar levels. If caught early and treated properly, fatty liver disease can be reversed. It can, however, develop into cirrhosis, fibrosis, hepatocellular carcinoma, and steatohepatitis if treatment is not received. If there is no severe fibrosis, the prognosis is usually good. Obesity, diabetes, and chronic alcohol use are linked to poor outcomes [15].

4. Conclusion

The findings of this study demonstrate that fatty liver disease has become a rapidly increasing metabolic and public health concern in Uzbekistan, primarily driven by obesity, diabetes, sedentary behavior, and high-carbohydrate diets. The analysis revealed that non-

alcoholic fatty liver disease (NAFLD) accounts for a significant portion of chronic liver disorders, with the highest prevalence observed in regions such as Andijan and Fergana. High levels of liver enzymes, radiographic findings, and anomalies in metabolism were some of the factors that verified the high level of association between hepatic steatosis and metabolic syndrome elements. These results emphasize the necessity of early diagnostic screening and educating the population about their health and thorough management approaches employing lifestyle changes, pharmacological treatment, and preventative monitoring. The findings of this study are relevant in any other discipline, and it is crucial to interdisciplinary cooperation between hepatologists, endocrinologists, and nutritionists to minimize the national disease burden. Further research should focus on longitudinal cohort studies to evaluate the long-term progression of NAFLD, the genetic and environmental determinants specific to the Uzbek population, and the effectiveness of targeted prevention programs aimed at mitigating metabolic risk factors and improving liver health outcomes.

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