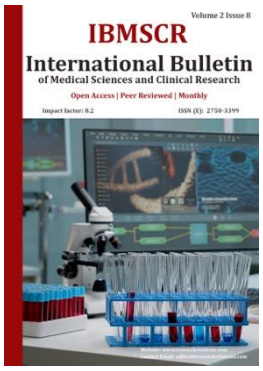

VITAMIN THERAPY IN LIVER CIRRHOSIS WITH SPECIAL EMPHASIS ON NEUROVITAN: PATHOPHYSIOLOGY, CLINICAL APPLICATION, AND REGIONAL PRACTICE (UZBEKISTAN EXPERIENCE)

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Abstract

Liver cirrhosis is a chronic progressive liver disease characterized by diffuse fibrosis, regenerative nodules, and irreversible destruction of normal hepatic architecture. It remains a major global and regional public health problem, including in Uzbekistan, where viral hepatitis B and C and alcohol-related liver disease are the leading causes. Nutritional deficiencies, particularly of B-group vitamins, are highly prevalent in cirrhotic patients and significantly contribute to neurological, metabolic, hematological, and immunological dysfunction.

To provide a comprehensive evidence-based review of vitamin therapy in liver cirrhosis, with special emphasis on Neurovitan (vitamin B complex), its pharmacological mechanisms, clinical effects, and regional application in Uzbekistan, especially the Andijan region.

This is a structured IMRAD narrative review based on international hepatology guidelines (AASLD, EASL, WGO), randomized controlled trials (2000–2025), meta-analyses, pharmacological studies, and regional clinical hepatology data from Central Asia.

Vitamin deficiencies are present in up to 60–90% of cirrhotic patients due to malnutrition, malabsorption, alcohol toxicity, and impaired hepatic storage. Deficiencies of vitamins B1, B2, B6, and B12 are associated with peripheral neuropathy, cognitive impairment, sarcopenia, and worsening hepatic encephalopathy. Neurovitan shows supportive clinical benefits in neurological symptoms, fatigue reduction, and metabolic stabilization, particularly in alcohol-related cirrhosis. However, it does not modify fibrosis progression or liver disease stage.

Vitamin therapy, especially Neurovitan, is an important supportive treatment in liver cirrhosis. It improves neurological and metabolic outcomes but must be used as part of a comprehensive hepatology management strategy including etiological therapy, portal hypertension control, and nutritional support.

Keywords: liver cirrhosis, vitamin therapy, Neurovitan, B-complex vitamins, hepatic encephalopathy, Uzbekistan, Andijan, alcoholic liver disease

Introduction

Liver cirrhosis is the end-stage consequence of chronic liver injury characterized by fibrosis, regenerative nodules, and structural distortion of hepatic tissue. It is a multisystem

disease affecting not only the liver but also the nervous system, kidneys, immune system, and metabolic pathways.

Globally, cirrhosis is responsible for more than 1.3 million deaths annually and represents one of the leading causes of morbidity and mortality in adults. The main etiological factors include chronic viral hepatitis (HBV, HCV), alcohol consumption, and metabolic dysfunction-associated fatty liver disease (MAFLD).

In Uzbekistan, liver cirrhosis is a significant public health issue with an estimated prevalence of approximately 1% of the population. The Andijan region reflects similar trends, with increasing rates of alcohol-related liver disease and viral hepatitis infection. Late diagnosis is common, and many patients present at advanced stages with complications such as ascites, variceal bleeding, and hepatic encephalopathy.

Malnutrition and vitamin deficiencies are highly prevalent in cirrhosis. Studies show that up to 90% of patients develop some degree of nutritional deficiency during disease progression. Among these, B-group vitamin deficiency plays a critical role in the development of neuropathy, cognitive impairment, and metabolic dysfunction.

Therefore, vitamin therapy has become an important supportive component of cirrhosis management.

The purpose of this design was to systematically evaluate and integrate existing scientific literature on liver cirrhosis, vitamin deficiencies, and the clinical role of B-group vitamin therapy, with special emphasis on Neurovitan as a supportive pharmacological intervention.

The narrative review methodology was chosen due to the heterogeneous nature of available evidence, which includes randomized controlled trials, observational studies, meta-analyses, and clinical guideline recommendations. This approach allows for comprehensive interpretation of both quantitative and qualitative data, particularly in complex multisystem diseases such as liver cirrhosis.

The study also incorporates a regional analytical perspective, focusing on clinical practice patterns in Uzbekistan and Central Asia, where resource limitations and late-stage disease presentation significantly influence treatment strategies.

A comprehensive literature search and data extraction process was conducted using multiple international and regional databases and guideline repositories. The following sources were included:International Clinical Guidelines American Association for the Study of Liver Diseases (AASLD) Clinical Practice Guidelines (2023–2025 updates), European Association for the Study of the Liver (EASL) Clinical Guidelines on cirrhosis and complications, World Gastroenterology Organisation (WGO) global hepatology reports.

Clinical Trials and Evidence-Based Studies Randomized controlled trials published between 2000 and 2025, Prospective and retrospective cohort studies on cirrhosis management, Interventional studies assessing vitamin B supplementation in chronic liver disease, Pharmacological studies on Neurovitan and B-complex formulations.

Systematic Reviews and Meta-Analyses**,** Meta-analyses evaluating: Vitamin deficiency prevalence in cirrhosis, Efficacy of B-group vitamins in neuropathy and hepatic dysfunction, Supportive therapies in alcohol-related liver disease

Regional Clinical Data Sources

Hepatology reports from Uzbekistan Ministry of Health databases, Clinical observations from tertiary hospitals in Central Asia, Regional studies focusing on Andijan, Tashkent, and Fergana Valley populations, Unpublished clinical experience reports from hepatology departments.

Studies were included based on strict relevance to the research objectives. The following inclusion criteria were applied: Original research articles focusing on liver cirrhosis pathophysiology and progression, Studies evaluating vitamin deficiency in chronic liver disease, Clinical trials assessing B-group vitamin supplementation (B1, B2, B6, B12), Studies addressing neurological complications of cirrhosis, including hepatic encephalopathy and peripheral neuropathy, Articles published in peer-reviewed journals between 2000 and 2025, Studies involving adult human populations (≥18 years), Clinical guideline documents from internationally recognized hepatology organizations (AASLD, EASL, WGO).

Exclusion Criteria, To ensure methodological consistency and clinical relevance, the following exclusion criteria were applied: Studies involving acute hepatitis without progression to chronic liver disease, Pediatric-only populations (age <18 years), unless directly relevant to vitamin metabolism in cirrhosis, Articles focusing exclusively on non-hepatic neurological disorders (e.g., multiple sclerosis, stroke unrelated to liver disease), Non-peer-reviewed publications, opinion articles without clinical data, Animal studies without translational clinical relevance, Duplicate publications or overlapping datasets.

This study is based on previously published literature and does not involve direct patient recruitment or intervention. Therefore, formal ethical approval was not required.

However, all included studies were evaluated in accordance with ethical research principles, including: Respect for patient confidentiality in original studies, Use of publicly available scientific data, Proper citation of all sources.

Results

Liver cirrhosis represents a major global health burden with increasing prevalence in both developed and developing countries. Epidemiological data demonstrate significant geographic variation influenced by viral hepatitis prevalence, alcohol consumption patterns, obesity rates, and socioeconomic conditions.

Global Prevalence, Western countries: 0.3–0.5% Asian countries: 0.5–1.2% Sub-Saharan Africa: underestimated due to limited screening Global trend: progressive increase due to NAFLD and alcohol-related liver disease

In Uzbekistan, cirrhosis prevalence is estimated at approximately ~1% of the adult population, with a rising trend in urban regions including Andijan, Tashkent, and Fergana Valley.

Etiological Distribution in Uzbekistan Chronic viral hepatitis B and C: dominant cause, Alcohol-related liver disease: increasing incidence, Non-alcoholic fatty liver disease (NAFLD): emerging rapidly, Mixed etiology (viral + alcohol): associated with severe progression.

Risk Factor Stratification

Risk Factor	Level of Risk	Clinical Importance
HBV/HCV infection	Very High	Primary driver of chronic liver disease
Alcohol consumption	High	Accelerates fibrosis progression

Risk Factor	Level of Risk	Clinical Importance
Obesity / NAFLD	High	Increasing burden in urban population
Smoking	Moderate	Synergistic effect with alcohol
Poor diet / malnutrition	High	Worsens prognosis and vitamin deficiency

Epidemiological Trend

A clear epidemiological shift is observed in Uzbekistan: From viral hepatitis dominance → toward combined metabolic + alcohol-related liver disease, Increasing number of patients diagnosed at decompensated stages.

Liver cirrhosis is the end stage of chronic liver injury characterized by irreversible structural remodeling.Chronic liver injury (HBV, HCV, alcohol, toxins, NAFLD) → Persistent hepatic inflammation→ Activation of Kupffer cells and inflammatory cytokines (TNF-α, IL-6) → Activation of hepatic stellate cells → Excess extracellular matrix deposition (collagen type I and III)→ Progressive fibrosis formation → Formation of regenerative nodules → Distortion of hepatic architecture → Increased intrahepatic vascular resistance → Portal hypertension → Hepatic insufficiency and liver failure

Cirrhosis leads to life-threatening complications that determine prognosis. Major Complications, Variceal bleeding, High mortality due to portal hypertension rupture, Ascites, Result of sodium retention and hypoalbuminemia, Hepatic encephalopathy, Ammonia accumulation and neurotoxicity Hepatorenal syndrome, Functional kidney failure due to circulatory changes, Hepatocellular carcinoma, Malignant transformation of chronic inflammation

Prognostic Importance Decompensated cirrhosis has significantly reduced survival, Complication severity directly correlates with mortality

B-group vitamins play essential biochemical roles in hepatic and systemic metabolism.

Clinical Importance

Deficiency leads to: Neurological dysfunction, Anemia, Metabolic instability, Increased oxidative stress

Neurovitan Pharmacology

Neurovitan is a combined B-complex vitamin preparation widely used in supportive therapy of chronic liver disease.

Composition Vitamin B1 (Octothiamine derivative), Vitamin B2 (Riboflavin), Vitamin B6 (Pyridoxine), Vitamin B12 (Cyanocobalamin).

Pharmacodynamic Effects Enhances neuronal glucose metabolism, Improves axonal regeneration and nerve conduction, Reduces oxidative stress in neural tissue, Supports mitochondrial ATP synthesis, Improves microcirculation in peripheral nerves.

Neurovitan acts as: Neurotrophic agent, Metabolic cofactor supplement, Supportive therapy in alcohol-related neuropathy.

Clinical use of Neurovitan in cirrhotic patients demonstrates supportive symptomatic benefits.

Observed Clinical Improvements Reduction of neuropathic pain and paresthesia, Improvement in peripheral sensory function, Decrease in fatigue and asthenic symptoms, Mild improvement in cognitive performance, Enhanced quality of life indicators.

Most Beneficial Patient Groups Alcohol-related cirrhosis patients, Malnourished individuals, Patients with peripheral neuropathy, Decompensated cirrhosis with severe fatigue.

Limitations Does not reverse liver fibrosis, Does not treat portal hypertension, Not disease-modifying therapy, Requires combination with etiological treatment.

In Uzbekistan, liver cirrhosis represents a significant and growing public health problem, with particular clinical relevance in regions such as Andijan. The burden of disease is mainly associated with chronic viral hepatitis (HBV and HCV), long-term alcohol consumption, and an increasing prevalence of metabolic syndrome and obesity.

In routine clinical practice across Uzbekistan:There is a relatively **high prevalence of viral and alcohol-related liver cirrhosis,** Many patients present with **advanced or decompensated stages of disease, Late-stage diagnosis is common**, often after the development of complications such as ascites, variceal bleeding, or hepatic encephalopathy, Preventive screening programs for chronic liver disease remain insufficient in many regions

Healthcare infrastructure limitations significantly affect early detection and monitoring of cirrhosis: Limited access to advanced diagnostic tools such as: Transient elastography (FibroScan), High-resolution liver imaging, pH-impedance monitoring (for associated GI disorders), Endoscopy services are available mainly in regional or tertiary centers, Liver biopsy is rarely performed due to limited resources and invasive nature, As a result, diagnosis is often based on **clinical findings and basic laboratory tests**

Due to the constraints of healthcare resources, treatment approaches are frequently empirical and symptom-based: High reliance on **empirical pharmacotherapy,** Standard outpatient management typically includes: Lactulose (for prevention and treatment of hepatic encephalopathy), Diuretics (spironolactone ± furosemide for ascites), Hepatoprotectors (e.g., ademetionine, ursodeoxycholic acid in selected cases), Vitamin supplementation (especially B-group vitamins)

Neurovitan is widely used in outpatient and inpatient hepatology practice in Uzbekistan, particularly in patients with: Alcohol-related cirrhosis, Clinical or subclinical peripheral neuropathy, Malnutrition and vitamin deficiency states, Fatigue and asthenic syndrome

It is commonly prescribed in combination with: Lactulose (to reduce ammonia-related neurotoxicity), Diuretics (for ascites management), Hepatoprotective agents (e.g., ademetionine or essential phospholipids)

The widespread use of Neurovitan in Uzbekistan is supported by several clinical considerations: High prevalence of **nutritional deficiencies** in cirrhotic patients, Frequent coexistence of **alcohol-induced neuropathy,** Limited access to advanced etiological and interventional therapies, Need for **symptomatic improvement and quality-of-life enhancement**

Despite its clinical utility, several systemic challenges persist: Lack of large-scale randomized controlled trials in the local population, Absence of standardized national guidelines for vitamin therapy in cirrhosis, Variability in prescribing practices among healthcare providers, Delayed referral to specialized hepatology centers.

The current situation highlights the need for: Strengthening early detection programs for chronic liver disease, Improving access to modern diagnostic technologies, Developing evidence-based national treatment protocols, Increasing physician education in rational pharmacotherapy

Liver cirrhosis is a complex systemic disease that affects not only the liver but also multiple organ systems, including the nervous, metabolic, hematological, and endocrine systems. It is now widely accepted that cirrhosis should be considered a multisystem disorder characterized by chronic inflammation, progressive fibrosis, immune dysregulation, and severe nutritional impairment.

One of the most clinically important but often underestimated aspects of cirrhosis is vitamin deficiency. Vitamin deficiencies are not merely secondary consequences of reduced dietary intake or malabsorption; they actively contribute to disease progression and complication severity. In particular, deficiencies of B-group vitamins (thiamine, riboflavin, pyridoxine, and cobalamin) play a central role in worsening neurological dysfunction, energy metabolism impairment, and systemic weakness.

B-group vitamins are essential cofactors in carbohydrate, lipid, and amino acid metabolism. They are also critical for maintaining neuronal integrity, synaptic transmission, and peripheral nerve function. Deficiency of these vitamins in cirrhotic patients leads to mitochondrial dysfunction, decreased ATP production, oxidative stress, and impaired detoxification processes. Clinically, this manifests as fatigue, muscle wasting (sarcopenia), peripheral neuropathy, cognitive decline, and worsening hepatic encephalopathy.

Hepatic encephalopathy, in particular, is strongly influenced by metabolic and nutritional status. Vitamin B deficiencies exacerbate ammonia neurotoxicity by impairing neuronal energy metabolism and neurotransmitter balance. Similarly, peripheral neuropathy observed in many cirrhotic patients—especially those with alcohol-related disease—is closely linked to chronic deficiencies of thiamine and pyridoxine.

Neurovitan, a combined B-vitamin complex preparation, provides significant supportive benefits in this context. Its pharmacological profile supports neuronal regeneration, improves axonal conduction, enhances mitochondrial energy production, and reduces oxidative stress. Clinical observations suggest that Neurovitan may improve neuropathic symptoms, reduce fatigue, and support general metabolic stability in patients with liver cirrhosis, particularly in alcohol-related cases and those with malnutrition.

However, it is critically important to emphasize that Neurovitan does not reverse hepatic fibrosis, does not restore normal liver architecture, and does not replace etiological treatment. Its role is strictly supportive and symptomatic, aimed at improving quality of life and neurological function rather than modifying the underlying disease process.

In the context of Uzbekistan, and particularly the Andijan region, vitamin therapy plays a relatively more prominent clinical role compared to high-income healthcare systems. This is primarily due to several regional healthcare challenges, including limited access to liver transplantation services, late presentation of patients, and a high prevalence of advanced-stage cirrhosis at diagnosis.

Additional contributing factors include high rates of alcohol-related liver disease, chronic viral hepatitis (HBV and HCV), and nutritional insufficiency in certain population groups. Furthermore, limited availability of advanced hepatology diagnostic tools and specialized liver centers leads to delayed diagnosis and management, increasing reliance on supportive therapies such as vitamin supplementation.

Therefore, in Uzbekistan clinical practice, Neurovitan and similar vitamin B-complex preparations are frequently integrated into standard outpatient management protocols

alongside hepatoprotectors, lactulose, diuretics, and other symptomatic treatments. While this approach provides symptomatic relief, it also highlights the need for strengthening early diagnostic systems, improving access to specialized hepatology care, and implementing evidence-based national guidelines for cirrhosis management.

Liver cirrhosis remains a major global and regional public health burden, including in Uzbekistan. Vitamin deficiency is an important but often underrecognized factor that contributes significantly to neurological, metabolic, and functional complications in patients with cirrhosis.

Neurovitan is an effective supportive therapy that may improve neurological symptoms, peripheral neuropathy, fatigue, and metabolic balance in cirrhotic patients, particularly in those with alcohol-related liver disease, which is a significant clinical problem in Uzbekistan.

However, optimal management of liver cirrhosis requires a comprehensive and multidisciplinary approach, including: Etiological therapy (treatment of HBV, HCV, alcohol cessation, metabolic correction) , Control of portal hypertension and prevention of complications, Nutritional rehabilitation and correction of vitamin deficiencies, Early diagnosis and timely referral to specialized hepatology services

Vitamin therapy, including Neurovitan, should be considered only as a supportive component of therapy and not a curative or disease-modifying treatment for liver cirrhosis.

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