Do Herbal Supplements Offer Real Metabolic Benefits in MASLD?

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Metabolic Dysfunction-Associated Steatotic Liver Disease (MASLD), formerly NAFLD, represents a significant and growing public health challenge, driven by the global epidemics of obesity and type 2 diabetes. Despite its prevalence, effective pharmacological interventions remain limited, leaving many clinicians and patients searching for adjunctive therapies. This unmet need has led to increased interest in non-traditional approaches, including various herbal supplements.

KEY TAKEAWAYS

- The Pivot: Certain plant-derived therapies show a consistent pattern of improving metabolic markers associated with MASLD.
- The Data: Specific herbal compounds can influence liver enzyme levels and improve lipid profiles, though the magnitude of effect varies.
- The Action: Clinicians should be aware of the potential for these supplements to impact metabolic health, but also recognise the lack of robust, large-scale trial data to guide widespread recommendation.

MASLD is characterised by hepatic steatosis in individuals with metabolic risk factors, including obesity, type 2 diabetes, dyslipidaemia, or metabolic syndrome. The disease spectrum ranges from simple steatosis to steatohepatitis (MASH), fibrosis, cirrhosis, and hepatocellular carcinoma. Lifestyle modifications, primarily diet and exercise, form the cornerstone of management, but adherence is often challenging, and progression of liver disease can still occur. The absence of approved pharmacotherapies for MASLD means that many patients explore complementary and alternative medicines, including a wide array of herbal supplements.

These plant-derived therapies often target various aspects of MASLD pathophysiology, such as oxidative stress, inflammation, insulin resistance, and lipid metabolism. Common examples include milk thistle (silymarin), curcumin, green tea extract, and berberine. Each of these compounds possesses distinct bioactive components believed to exert their effects through different mechanisms, from antioxidant properties to modulation of metabolic pathways. The challenge for clinicians lies in discerning which, if any, of these supplements offer genuine, evidence-based benefits.

What the evidence suggests

Milk thistle, specifically its active component silymarin, has been extensively studied for its hepatoprotective properties. It is thought to stabilise hepatocyte membranes, scavenge free radicals, and inhibit lipid peroxidation. Some smaller studies indicate that silymarin can reduce liver transaminases (ALT and AST) in patients with MASLD, suggesting an improvement in liver cell integrity. But the impact on liver fat content or fibrosis progression remains less clear from the

available data.

Curcumin, derived from turmeric, is another compound with documented anti-inflammatory and antioxidant effects. Its potential role in MASLD stems from its ability to modulate inflammatory pathways and improve insulin sensitivity. Clinical observations suggest that curcumin supplementation may lead to reductions in liver fat and improvements in fasting blood glucose and lipid profiles. But the bioavailability of curcumin is notoriously low, raising questions about the effective dose and formulation required to achieve therapeutic concentrations in the liver.

Green tea extract, rich in catechins, particularly epigallocatechin gallate (EGCG), has garnered attention for its metabolic benefits. EGCG is believed to enhance fat oxidation, reduce lipid absorption, and improve insulin sensitivity. Some data indicate that green tea extract can lead to modest reductions in body weight, waist circumference, and liver enzymes in MASLD patients. The Oxford Handbook of Endocrinology and Diabetes provides further context on metabolic interventions.

Berberine, an isoquinoline alkaloid found in several plants, has shown promise in improving metabolic parameters. It activates AMP-activated protein kinase (AMPK), a key regulator of energy metabolism, leading to reduced hepatic gluconeogenesis, increased insulin sensitivity, and improved lipid profiles. In patients with MASLD, berberine has been associated with reductions in liver fat, body mass index, and markers of dyslipidaemia. The mechanism of action is complex, involving effects on gut microbiota and bile acid metabolism, which may contribute to its observed benefits.

The caveats

While these herbal supplements show some metabolic benefits, the evidence base is often limited by small study sizes, short durations, and heterogeneity in formulations and dosages. Many studies are not powered to detect changes in hard clinical endpoints like liver fibrosis or progression to cirrhosis. The lack of standardised products also makes it difficult to compare results across different investigations or to provide clear dosing recommendations for clinical practice. Potential drug-herb interactions and adverse effects are not always well-characterised, particularly with long-term use.

The regulatory landscape (the guidelines) for herbal supplements is also less stringent than for prescription medications, meaning product quality and purity can vary significantly. This poses a challenge for clinicians advising patients, as the actual content and potency of a supplement may not match what is stated on the label. Patients often self-prescribe these agents, sometimes without informing their healthcare providers, which can complicate clinical assessment and management.

> **CLINICAL IMPLICATIONS**
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> The persistent interest in herbal supplements for MASLD highlights a critical gap in our therapeutic arsenal. Clinicians are frequently asked about these agents, and while some data suggest metabolic improvements, the evidence is rarely robust enough to warrant a strong recommendation. We are left in a difficult position, balancing patient autonomy and the desire for non-pharmacological options against the need for rigorous, reproducible clinical data.
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> The variability in product quality and the absence of large, well-controlled trials mean that any observed benefits are often difficult to attribute definitively or to replicate consistently. For now, the standard of care remains lifestyle modification, and while adjuncts may offer some symptomatic relief or minor metabolic shifts, they do not replace the fundamental need for dietary and exercise interventions. Patients should be

> encouraged to discuss all supplements with their GP to avoid potential interactions or adverse effects. Pharmaceutical companies are actively developing new agents for MASLD and MASH, with several compounds in late-stage clinical trials. These investigational therapies, once approved, will likely provide more definitive and predictable outcomes than the current landscape (the trial pipeline) of herbal remedies. Until then, a cautious and evidence-informed approach to herbal supplements is essential, focusing on patient safety and managing expectations.

EDITORIAL & AI STANDARDS

AI tools are used to structure and summarise evidence from peer-reviewed primary sources. Articles that carry a signed Editor's take have been read in full by William Lopes. The others are not individually read by an editor, so check the cited source before relying on a figure.

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