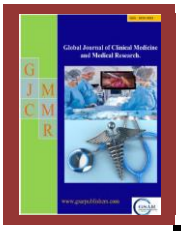

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HERBAL DIP / LIVER CARE: A combination of natural herbs with modernised technique for extraction of Phytochemical components and its medical benefits

By

Dr. Prem Kumar[1], Mrs. Prabhavathi[2] and Mr. Sushanth[3]

[1,2,3]Crescent Biologicals Pvt Ltd, 45/1A, Vadiyarkottai via, Balanayapalli pt, SIDCO Bargur, Krishnagiri - 635108
www.crescentbiologicals.com

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Abstract

The liver is a vital organ central to metabolic homeostasis, detoxification, and the regulation of biochemical processes necessary for health. Rising incidences of liver disorders, including non-alcoholic fatty liver disease (NAFLD), hepatitis, and cirrhosis, necessitate safe, natural, and effective interventions. In this context, traditional botanical medicine, grounded in holistic principles, offers potent hepatoprotective solutions. This article explores the synergistic liver-supportive potential of eight well-established medicinal plants—Kale (Brassica oleracea), Lemon (Citrus limon), Garlic (Allium sativum), Dandelion Root (Taraxacum officinale), Milk Thistle (Silybum marianum), Licorice Root (Glycyrrhiza glabra), Astragalus (Astragalus membranaceus), and Ginger (Zingiber officinale)—each extensively studied for their antioxidant, antimicrobial, anti-inflammatory, and detoxifying effects.

These botanicals were analyzed under five critical categories: Taxonomy, Physio-Chemical Composition, Antimicrobial Activity, Antioxidant Activity, and their Mechanism of Action in liver care. Notably, compounds such as silymarin in milk thistle, allicin in garlic, glycyrrhizin in licorice, and gingerols in ginger exhibit direct hepatocellular protection, improve bile flow, and inhibit fibrosis. Furthermore, flavonoids, polyphenols, terpenes, and sulfur-containing compounds across these plants help scavenge free radicals, mitigate inflammation, and enhance liver detox pathways. Kale and lemon, rich in vitamins K, C, and bioactive phytochemicals, support enzymatic detoxification and promote glutathione production, essential for liver health. Astragalus and dandelion root further contribute to immunomodulation and bile secretion enhancement.

The unique innovation of this study lies in the Preactivated Vedic Treatment methodology, a traditional pre-extraction technique involving purification, energization, and controlled blending of herbs based on ancient Ayurvedic principles. This method enhances bioavailability, potency, and the synergistic action of the phytoconstituents, enabling superior therapeutic outcomes without chemical additives. By integrating ancient wisdom with modern evidence-based analysis, this study proposes a novel, holistic phytotherapeutic approach to liver care that is safe, sustainable, and effective.

In conclusion, the blend of these eight botanicals processed via Preactivated Vedic Treatment represents a promising natural formulation for liver protection, detoxification, and regeneration.

INTRODUCTION:

The liver is the body's master detoxifier—an organ essential for processing nutrients, breaking down toxins, balancing hormones, regulating blood sugar levels, and supporting immune function. As the body's biochemical powerhouse, it filters more than a liter of blood per minute and orchestrates over 500 physiological functions. Yet, in today's fast-paced lifestyle characterized by poor diet, environmental toxins, alcohol consumption, and sedentary habits, liver function is often compromised, giving rise to conditions such as non-

*Corresponding Author: **Dr. Prem Kumar**

alcoholic fatty liver disease (NAFLD), hepatitis, cirrhosis, and liver cancer. The increasing global burden of liver-related disorders has spurred the demand for effective, natural, and safe interventions that can restore and protect liver health.

In traditional healing systems like Ayurveda, the liver (referred to as *yakrit*) is viewed not only as a detoxifying organ but also as the seat of metabolism, emotions, and vitality. Liver health is intricately linked to digestion (*agni*), elimination (*mala*), and mental well-being. Ayurvedic medicine emphasizes the importance of daily detoxification through diet, herbs, and lifestyle practices. Modern science now supports the ancient notion that plant-based compounds, especially polyphenols, flavonoids, and antioxidants, play a critical role in protecting hepatic cells and enhancing liver function. This has laid the foundation for formulating herbal liver care drinks as both a preventive and therapeutic measure.

The Concept of Liver Care through Functional Herbal Beverages

Herbal liver care drinks are becoming a popular health supplement for individuals seeking to support liver detox, digestion, and metabolic health. These functional beverages are often rich in antioxidants, anti-inflammatory compounds, and hepatoprotective phytochemicals. The advantage of liquid formulations lies in their high absorption, easy digestion, and ability to deliver a spectrum of bioactive molecules quickly into the bloodstream.

The liver care drink discussed in this article is composed of eight powerful botanicals: **Kale, Lemon, Garlic, Dandelion Root, Milk Thistle, Licorice Root, Astragalus**, and **Ginger**—each chosen for their scientifically validated role in liver health. These herbs work individually and synergistically to reduce oxidative stress, stimulate bile secretion, prevent fat accumulation, repair damaged hepatocytes, and inhibit fibrotic processes.

1. **Kale (*Brassica oleracea*)** – Rich in chlorophyll, vitamin K, vitamin C, and sulfur compounds, kale supports liver enzyme activity and aids in detoxifying carcinogens.
2. **Lemon (*Citrus limon*)** – An excellent source of vitamin C and citric acid, lemon juice promotes bile flow and liver regeneration.
3. **Garlic (*Allium sativum*)** – Contains sulfur compounds like allicin, which activate liver enzymes and reduce hepatic inflammation.
4. **Dandelion Root (*Taraxacum officinale*)** – Traditionally used to enhance bile production and relieve liver congestion.
5. **Milk Thistle (*Silybum marianum*)** – Contains silymarin, a compound known to regenerate liver cells and combat liver fibrosis.
6. **Licorice Root (*Glycyrrhiza glabra*)** – Offers anti-inflammatory and antiviral effects, particularly useful in hepatitis.
7. **Astragalus (*Astragalus membranaceus*)** – An adaptogen with hepatoprotective, antioxidant, and immune-boosting properties.
8. **Ginger (*Zingiber officinale*)** – Stimulates digestion, reduces inflammation, and protects liver tissue from oxidative damage.

Each of these plants provides specific nutrients and phytochemicals that fortify the liver's ability to neutralize toxins, process fats, and regulate blood sugar levels. When combined, they form a holistic remedy rooted in both ancient wisdom and modern scientific validation.

Preactivated Vedic Treatment: Enhancing the Power of Herbs

The uniqueness of this liver care drink lies not only in its plant composition but also in the **Preactivated Vedic Treatment (PVT)** methodology employed in preparing the formulation. This traditional processing method enhances the potency, purity, and bioavailability of herbs. In classical Ayurveda, preactivation involves a series of steps including: **purification, levigation** and **energization**

Modern phytopharmacological studies have shown that such traditional processing increases solubility, breaks down cellular walls for better extraction, and sometimes even generates new bioactive derivatives. For example, fermented or pretreated garlic yields higher levels of S-allyl cysteine, a compound with superior antioxidant activity. Similarly, milk thistle seeds subjected to traditional churning and decoction methods release more active silymarin flavonolignans.

This Preactivated Vedic Treatment is designed to prepare the liver care drink in a way that aligns with both nature's rhythm and human biology, allowing the herbs to be more effective in restoring hepatic balance and vitality. Unlike synthetic liver tonics, this approach avoids harsh solvents, additives, or preservatives, making the formulation safer for long-term use and suitable for individuals of all ages.

Liver Health in the Modern Context

Lifestyle-related liver damage is now one of the most common forms of hepatic dysfunction, with non-alcoholic fatty liver disease (NAFLD) affecting nearly 25% of the global population. Chronic stress, poor diet, high sugar intake, and exposure to chemicals contribute to liver overload. Conventional treatments primarily involve symptomatic relief and lifestyle modification, with limited pharmacological options for reversing cellular damage. This reality points to the importance of preventive care and functional nutrition, where liver care beverages serve as a bridge between food and medicine.

By delivering a concentrated source of antioxidants, essential nutrients, and therapeutic plant compounds, liver care drinks can help:

- Restore hepatic enzyme levels
- Reduce elevated liver transaminases (ALT, AST)
- Support bile production and flow
- Prevent fatty infiltration and fibrosis
- Promote detoxification of heavy metals, alcohol, and pharmaceuticals
- Enhance digestion and nutrient assimilation

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MATERIALS AND METHOODOLOGY

Kale (*Brassica oleracea* var. *acephala*)

1. Taxonomy

Kale belongs to the Brassicaceae family and is a cultivar of *Brassica oleracea*—a species that also includes cabbage, broccoli, and cauliflower. Unlike its close relatives, kale has open, leafy heads and is cultivated for its edible leaves, which are rich in nutrients and medicinal compounds.

- **Kingdom**: Plantae
- **Clade**: Angiosperms
- **Clade**: Eudicots
- **Order**: Brassicales
- **Family**: Brassicaceae
- **Genus**: *Brassica*
- **Species**: *B. oleracea* var. *acephala*

This nutrient-dense green has a long history of use in traditional diets and natural healing systems for supporting overall organ health.

2. Physio-Chemical Composition

Kale is widely recognized for its dense nutritional profile and abundance of bioactive compounds that promote liver detoxification and regeneration.

- Vitamins: High in Vitamin K (essential for clotting and anti-inflammatory effects), Vitamin C (a powerful antioxidant), and Vitamin A (from beta-carotene), which supports epithelial tissue repair.
- Minerals: Provides calcium, magnesium, iron, and potassium—key for enzyme activation and fluid balance.
- Fiber: Aids in digestion and bile acid binding, indirectly supporting the liver's role in detoxification.
- Glucosinolates: Sulfur-rich compounds that are precursors to isothiocyanates, which induce liver detoxification enzymes.
- Flavonoids and polyphenols: Notably quercetin and kaempferol, which are known for their liver-protective and antioxidant properties.

Kale is great for digestion, high in vitamin K, loaded with powerful antioxidants, supports cardiovascular health, enhances liver detoxification, and provides abundant vitamin C for immune and cellular protection.

3. Antimicrobial Activity

Kale exhibits notable antimicrobial effects, which support the liver's role in filtering pathogens and toxins from the bloodstream.

- Studies have shown that glucosinolates and their derivatives (such as sulforaphane and indole-3-carbinol) inhibit the growth of harmful bacteria like *E. coli* and *S. aureus*.
- These compounds assist the liver in neutralizing endotoxins and clearing infections, reducing systemic stress.
- Kale's phenolic compounds damage microbial membranes, further aiding the liver's immune surveillance functions.

4. Antioxidant Activity

One of kale's most powerful contributions to liver health is through its rich antioxidant profile.

- Vitamin C and beta-carotene prevent oxidative damage to liver cells.
- Kaempferol and quercetin scavenge free radicals and reduce inflammation in hepatic tissues.
- Kale helps maintain glutathione levels—an essential antioxidant produced by the liver itself for detoxification.
- It mitigates oxidative stress, a major factor in the development of liver fibrosis, fatty liver, and cirrhosis.

These antioxidants not only protect liver cells from damage but also promote cellular repair and regeneration.

5. Mechanism of Action of Kale in Liver Care

Kale supports liver function and protection through several biochemical and physiological pathways:

- Phase I and Phase II Detoxification: Glucosinolates and isothiocyanates stimulate liver enzymes such as cytochrome P450 and glutathione-S-transferases, promoting detoxification of xenobiotics and carcinogens.
- Anti-inflammatory Modulation: Kale's flavonoids suppress liver inflammation by downregulating pro-inflammatory cytokines (e.g., TNF-α, IL-6).
- Antifibrotic Effects: By preventing oxidative damage and lipid peroxidation, kale may help inhibit the progression of liver fibrosis and steatosis.
- Bile Regulation: The fiber and sulfur compounds support bile production and flow, aiding in fat digestion and toxin excretion.
- Regeneration: Nutrients such as Vitamin A and C contribute to tissue repair and regeneration of hepatocytes (liver cells).

Result:

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Product name		Kale		
Source		*Brassica oleracea* (Acephala group)		
Parts used		Leaves		
Appearance		Green, dried leaves		
Moisture Content		≤ 8%		
Ash Content		≤ 10%		
Ph		6.0-7.5		
Odour		Characteristic leafy odour		
Solubility		Soluble in water, partially soluble in alcohol		
Physio – chemical properties	**Specification**	**Batch No: CBBO001**	**Batch No: CBBO002**	**Batch No: CBBO003**
Specific Gravity @20°c(g/ml)	0.850-0.900	0.865	0.872	0.868
Optical Rotation @ 20°c(Degrees)	+25 to +40	+30	+32	+29
Refractive index @ 20°c	1.450-1.460	1.455	1.456	1.454
Microbial test	**Specification**	**Batch No: CBBO001**	**Batch No: CBBO002**	**Batch No: CBBO003**
Aerobic total plate count	<100000CFU/ml	<100CFU/ml	<100CFU/ml	<100CFU/ml
Yeast and mold	<1000CFU/ml	<10CFU/ml	<10CFU/ml	<10CFU/ml
E. coli	Negative	Negative	Negative	Negative
Salmonella	Negative	Negative	Negative	Negative
Staphylococcus sp	Negative	Negative	Negative	Negative
Shelf life		24 Month		

Lemon (*Citrus limon*)

1. Taxonomy

Lemon is a widely consumed citrus fruit known for its refreshing taste and medicinal properties. It belongs to the Rutaceae family and is believed to be a hybrid between bitter orange (*Citrus aurantium*) and citron (*Citrus medica*). Native to Asia, lemon has been used for centuries in traditional medicine for detoxification, immune support, and digestive health.

- **Kingdom**: Plantae
- **Clade**: Angiosperms
- **Clade**: Eudicots
- **Clade**: Rosids
- **Order**: Sapindales
- **Family**: Rutaceae
- **Genus**: *Citrus*
- **Species**: *Citrus limon*

It is widely grown in tropical and subtropical regions and forms a core component of many herbal and naturopathic liver care regimens.

2. Physio-Chemical Composition

Lemon is known for its rich blend of organic acids, essential oils, vitamins, and flavonoids, all of which contribute to liver protection and detoxification.

- Vitamin C: Lemons are one of the richest sources of ascorbic acid, a potent antioxidant essential for tissue repair and immune support.
- Citric acid: A key compound that enhances enzymatic activity in the liver and aids in bile production.
- Flavonoids: Including hesperidin, eriocitrin, and diosmin, which have strong anti-inflammatory and hepatoprotective effects.
- Essential oils: Such as limonene and pinene, which support liver detox and fat metabolism.
- Potassium and calcium: Important for cellular signaling and enzyme function in the liver.
- Pectin: A soluble fiber that helps eliminate toxins and binds bile acids in the digestive system.

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Lemon is great for digestion, rich in vitamin C, filled with powerful antioxidants, and supports cardiovascular and liver health through its ability to aid detoxification and reduce fat accumulation in the liver.

3. Antimicrobial Activity

Lemon possesses significant antimicrobial potential, which indirectly supports liver function by reducing microbial load and gut-derived toxins.

- Citrus essential oils, particularly limonene and citral, exhibit strong antimicrobial effects against pathogens such as *E. coli*, *Salmonella*, and *Candida albicans*.
- These compounds help reduce intestinal dysbiosis and lower endotoxin levels in the bloodstream, decreasing the liver's detox burden.
- Flavonoids in lemon also inhibit viral replication, which is particularly useful in preventing hepatitis viruses that directly affect liver health.

4. Antioxidant Activity

The liver is highly vulnerable to oxidative stress due to its central role in detoxification, making antioxidants crucial in protecting hepatocytes.

- Vitamin C neutralizes reactive oxygen species (ROS) and boosts glutathione production—one of the liver's most vital endogenous antioxidants.
- Eriocitrin, a lemon-specific flavonoid, has demonstrated strong free radical scavenging activity and protection against lipid peroxidation in liver tissues.
- Antioxidants in lemon protect against inflammation, cellular aging, and liver fibrosis, especially in fatty liver and cirrhosis models.

Regular lemon intake helps restore redox balance and reduce oxidative stress, contributing to the prevention of liver damage.

5. Mechanism of Action of Lemon in Liver Care

Lemon supports liver health through a multifaceted set of actions involving detoxification, bile stimulation, and cellular defense mechanisms.

- Enhancement of Detox Pathways: Lemon promotes Phase II liver detoxification by supporting glutathione production and activating enzymes that neutralize xenobiotics.
- Bile Secretion and Fat Digestion: The citric acid in lemon stimulates bile flow, aiding in the digestion of fats and the elimination of toxins. This also prevents gallstone formation.
- Lipid Metabolism: Limonene and flavonoids improve hepatic fat metabolism, reducing fatty infiltration of the liver (hepatic steatosis).
- Anti-inflammatory Action: Lemon flavonoids reduce cytokine activity and inhibit inflammatory signaling pathways such as NF-κB.
- Liver Regeneration: Ascorbic acid and polyphenols promote tissue repair and regeneration by reducing oxidative DNA damage and promoting collagen synthesis.

Result:

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Product name		Lemon		
Source		*Citrus limon*		
Parts used		Fruit peel		
Appearance		Yellowish, dried peel powder		
Moisture Content		≤ 8%		
Ash Content		≤ 7%		
Ph		3.0-4.0		
Odour		Characteristic citrus odour		
Solubility		Soluble in water, partially soluble in alcohol		
Physio – chemical properties	**Specification**	**Batch No: CBCL001**	**Batch No: CBCL002**	**Batch No: CBCL003**
Specific Gravity @20°c(g/ml)	0.840-0.880	0.850	0.857	0.853
Optical Rotation @ 20°c(Degrees)	+60 to +75	+68	+70	+66
Refractive index @ 20°c	1.470-1.480	1.475	1.476	1.474
Microbial test	**Specification**	**Batch No: CBCL001**	**Batch No: CBCL002**	**Batch No: CBCL003**
Aerobic total plate count	<100000CFU/ml	<100CFU/ml	<100CFU/ml	<100CFU/ml
Yeast and mold	<1000CFU/ml	<10CFU/ml	<10CFU/ml	<10CFU/ml
E. coli	Negative	Negative	Negative	Negative
Salmonella	Negative	Negative	Negative	Negative
Staphylococcus sp	Negative	Negative	Negative	Negative
Shelf life		24 Month		

Garlic (*Allium sativum*)

1. Taxonomy

Garlic, one of the oldest cultivated medicinal plants, belongs to the Amaryllidaceae family. It has been widely used for its flavor, as well as its therapeutic properties across cultures. Traditionally valued for detoxification, infection control, and cardiovascular support, garlic has recently gained significant attention for its protective effects on liver function.

- **Kingdom**: Plantae
- **Clade**: Angiosperms
- **Clade**: Monocots
- **Order**: Asparagales
- **Family**: Amaryllidaceae
- **Genus**: *Allium*
- **Species**: *Allium sativum*

Garlic's active sulfur compounds and antioxidants are at the core of its hepatoprotective potential.

2. Physio-Chemical Composition

Garlic is a rich source of organosulfur compounds, vitamins, minerals, and flavonoids that support both detoxification and regeneration of liver cells.

- Organosulfur Compounds: The most prominent are allicin, diallyl disulfide (DADS), diallyl trisulfide (DATS), and S-allyl cysteine, which exhibit hepatoprotective, anti-inflammatory, and antioxidant effects.
- Vitamins: Contains vitamin B6, vitamin C, and thiamine, all important for enzyme function and cellular repair.
- Minerals: Garlic provides selenium, manganese, calcium, and iron—critical cofactors for detox enzyme systems.
- Flavonoids: Particularly quercetin, known for its ability to reduce liver inflammation and oxidative stress.
- Prebiotic Fiber: Supports healthy gut flora and reduces the burden of endotoxins on the liver.

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Garlic is great for digestion, high in powerful antioxidants, supports cardiovascular and liver health, and helps neutralize toxins in the body through its rich sulfur and vitamin content.

3. Antimicrobial Activity

Garlic is renowned for its broad-spectrum antimicrobial properties, which indirectly support liver health by reducing infection and toxin load.

- Allicin, the principal bioactive compound, has been shown to inhibit bacteria (*H. pylori*, *E. coli*, *S. aureus*), fungi (*Candida*), and viruses (hepatitis and influenza strains).
- By reducing harmful gut bacteria, garlic minimizes the leakage of endotoxins like LPS (lipopolysaccharides) into the portal vein, thus decreasing liver inflammation.
- It can also assist in preventing or mitigating liver infections caused by hepatitis viruses and other microbial threats.

4. Antioxidant Activity

Garlic is one of the most potent natural antioxidants, particularly effective in reducing oxidative damage in the liver.

- S-allyl cysteine enhances the liver's antioxidant enzyme systems such as glutathione peroxidase, superoxide dismutase (SOD), and catalase.
- Garlic protects hepatocytes against free radicals and lipid peroxidation, which are commonly elevated in fatty liver disease, alcoholic liver disease, and hepatitis.
- Studies have shown that garlic supplementation reduces oxidative stress markers and boosts liver antioxidant status in both animal and human models.

These effects are crucial for maintaining liver integrity and preventing disease progression

5. Mechanism of Action of garlic in Liver Care

Garlic's hepatoprotective mechanisms are diverse and well-documented:

- Detoxification Enzyme Modulation: Garlic compounds stimulate both Phase I (oxidation) and Phase II (conjugation) detoxification pathways in the liver, enhancing metabolism of drugs, heavy metals, and pollutants.
- Anti-fibrotic Effects: Diallyl disulfide inhibits hepatic stellate cell activation, reducing fibrosis and collagen accumulation.
- Anti-inflammatory Action: Garlic suppresses inflammatory pathways, including NF-κB, and reduces the expression of cytokines like TNF-α and IL-6 in liver tissue.
- Lipid Regulation: Garlic helps normalize lipid profiles by reducing cholesterol and triglyceride synthesis in the liver, beneficial in non-alcoholic fatty liver disease (NAFLD).
- Cell Regeneration: By reducing oxidative DNA damage and supporting mitochondrial function, garlic enhances liver cell survival and regeneration.

Product name		Garlic		
Source		*Allium sativum*		
Parts used		Bulb		
Appearance		Off-white to pale yellow, dried powder		
Moisture Content		≤ 8%		
Ash Content		≤ 6%		
Ph		5.0-6.5		
Odour		Strong pungent, characteristic garlic odor		
Solubility		Partially soluble in water and alcohol		
Physio – chemical properties	**Specification**	**Batch No: CBAS001**	**Batch No: CBAS002**	**Batch No: CBAS003**
Specific Gravity @20°c(g/ml)	0.890-0.920	0.900	0.912	0.905
Optical Rotation @ 20°c(Degrees)	-20 to -10	-15	-13	-16
Refractive index @ 20°c	1.460-1.470	1.465	1.467	1.464

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Microbial test	Specification	Batch No: CBAS001	Batch No: CBAS002	Batch No: CBAS003
Aerobic total plate count	<100000CFU/ml	<100CFU/ml	<100CFU/ml	<100CFU/ml
Yeast and mold	<1000CFU/ml	<10CFU/ml	<10CFU/ml	<10CFU/ml
E. coli	Negative	Negative	Negative	Negative
Salmonella	Negative	Negative	Negative	Negative
Staphylococcus sp	Negative	Negative	Negative	Negative
Shelf life		24 Month		

Result:

Dandelion Root (*Taraxacum officinale*)

1. Taxonomy

Dandelion, scientifically known as *Taraxacum officinale*, is a perennial herb belonging to the Asteraceae family. Native to Europe and Asia, dandelion has spread widely across the world due to its resilience and medicinal properties. The root of this plant has been used for centuries in traditional medicine to support liver health, detoxification, and digestion.

- **Kingdom**: Plantae
- **Clade**: Angiosperms
- **Clade**: Eudicots
- **Order**: Asterales
- **Family**: Asteraceae
- **Genus**: *Taraxacum*
- **Species**: *T. officinale*

Dandelion root is recognized for its liver detoxification properties, and it has become a staple in herbal medicine for its ability to support liver regeneration and detoxification.

2. Physio-Chemical Composition

Dandelion root is packed with bioactive compounds that provide a range of therapeutic benefits, particularly in supporting liver function and overall detoxification.

- Inulin: A prebiotic fiber that promotes gut health, which is essential for the liver's detoxification process.
- Taraxasterol: A pentacyclic triterpenoid that has hepatoprotective properties, reducing liver inflammation and oxidative damage.
- Polysaccharides: These compounds help reduce liver toxicity and support liver regeneration.
- Flavonoids: Including luteolin and apigenin, which have antioxidant and anti-inflammatory effects.
- Bitter compounds: These stimulate bile production, aiding in fat digestion and toxin elimination.
- Vitamins and Minerals: Dandelion root contains vitamin A, vitamin C, B-vitamins, potassium, calcium, and iron, which are important for liver health and overall cellular function.

Dandelion root is rich in nutrients, supports blood sugar regulation, offers heart health benefits, has anti-inflammatory properties, and may even provide cancer protection through its potent antioxidants and immune-boosting compounds.

3. Antimicrobial Activity

Dandelion root is known for its antimicrobial properties, which contribute to liver health by reducing the burden of harmful pathogens in the body.

- Phenolic compounds in dandelion root, including chlorogenic acid, have demonstrated antibacterial effects against *E. coli*, *Salmonella*, and *Staphylococcus aureus*.
- These compounds help reduce bacterial overgrowth in the gut, preventing toxins from being absorbed into the bloodstream and stressing the liver.
- Dandelion also exhibits antiviral and antifungal properties, which may protect the liver from infections, such as viral hepatitis, that can cause long-term liver damage.

4. Antioxidant Activity

Dandelion root is a powerhouse of antioxidants, which is essential for protecting the liver from oxidative stress and preventing liver damage.

- Flavonoids like luteolin and apigenin protect liver cells from free radical damage and reduce inflammation in liver tissue.
- Chicoric acid, a phenolic compound, has shown significant antioxidant properties, neutralizing oxidative stress and preventing liver cell apoptosis.
- The beta-carotene content in dandelion root also contributes to reducing oxidative damage to the liver, promoting liver regeneration, and improving overall liver function.

By combating oxidative stress, dandelion root reduces the risk of liver fibrosis, cirrhosis, and fatty liver disease.

6. Mechanism of Action of Dandelion Root in Liver Care

Dandelion root supports liver health through several pathways, making it an effective herb for detoxification, liver regeneration, and protection.

- Bile Production and Detoxification: Dandelion root promotes bile secretion, which helps emulsify fats and facilitates the elimination of fat-soluble toxins

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from the liver. The increased bile flow supports detoxification and enhances fat digestion.

- Hepatoprotective Action: The triterpenoid compound taraxasterol in dandelion root reduces liver inflammation and protects against oxidative damage by scavenging free radicals.
- Liver Regeneration: Dandelion root stimulates the regeneration of liver cells by promoting the production of liver enzymes essential for detoxification.
- Blood Sugar Regulation: The root may help lower blood glucose levels, reducing the risk of liver damage associated with high blood sugar and improving insulin sensitivity, thus benefiting liver health in individuals with diabetes.
- Anti-inflammatory Effects: Dandelion root modulates inflammatory pathways, reducing liver inflammation caused by toxins, alcohol, and metabolic disorders such as non-alcoholic fatty liver disease (NAFLD).
- Cholesterol Reduction: By enhancing liver function and reducing fat accumulation in liver cells, dandelion root helps normalize lipid levels, reducing the risk of atherosclerosis and fatty liver disease.

Product name		Dandelion Root		
Source		*Taraxacum officinale*		
Parts used		Root		
Appearance		Brown to light brown, dried powder		
Moisture Content		≤ 10%		
Ash Content		≤ 8%		
Ph		5.5-7.0		
Odour		Earthy, slightly bitter characteristic odor		
Solubility		Soluble in water, partially soluble in ethanol		
Physio – chemical properties	**Specification**	**Batch No: CBTO001**	**Batch No: CBTO002**	**Batch No: CBTO003**
Specific Gravity @20°c(g/ml)	0.850-0.890	0.872	0.865	0.870
Optical Rotation @ 20°c(Degrees)	+5 to +20	+10	+12	+11
Refractive index @ 20°c	1.450-1.460	1.456	1.454	1.455
Microbial test	**Specification**	**Batch No: CBTO001**	**Batch No: CBTO002**	**Batch No: CBTO003**
Aerobic total plate count	<100000CFU/ml	<100CFU/ml	<100CFU/ml	<100CFU/ml
Yeast and mold	<1000CFU/ml	<10CFU/ml	<10CFU/ml	<10CFU/ml
E. coli	Negative	Negative	Negative	Negative
Salmonella	Negative	Negative	Negative	Negative
Staphylococcus sp	Negative	Negative	Negative	Negative
Shelf life		24 Month		

Result:

Milk Thistle (*Silybum marianum*)

1. Taxonomy

Milk thistle, scientifically known as *Silybum marianum*, is a medicinal herb widely recognized for its hepatoprotective properties. It has a long history of use in traditional medicine, especially in Europe and Asia, to support liver detoxification and treat liver-related disorders.

- **Kingdom**: Plantae
- **Clade**: Angiosperms
- **Clade**: Eudicots
- **Order**: Asterales
- **Family**: Asteraceae
- **Genus**: *Silybum*
- **Species**: *S. marianum*

The plant is particularly famous for its active compound silymarin, which is extracted from the seeds and has been extensively studied for its therapeutic effects on the liver

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2. Physio-Chemical Composition

Milk thistle is packed with potent bioactive compounds that contribute to liver protection, detoxification, and overall health improvement.

- Silymarin Complex: A mixture of flavonolignans, mainly silybin, silydianin, and silychristin, which account for the bulk of the plant's hepatoprotective effects.
- Flavonoids: Act as antioxidants and anti-inflammatories.
- Fatty acids: Such as linoleic acid and oleic acid, support cell membrane repair.
- Vitamin E, selenium, and zinc: Essential micronutrients for liver enzyme function and immune support.
- Other nutrients: Milk thistle supports digestion, boosts the immune system, and contributes to brain health, hair growth, stress and pain relief, and blood pressure regulation.

3. Antimicrobial Activity

Milk thistle exhibits notable antimicrobial effects that contribute indirectly to liver protection by minimizing pathogen-related toxin load.

- Silymarin has demonstrated inhibitory effects against bacteria such as *Staphylococcus aureus*, *E. coli*, and *Pseudomonas aeruginosa*.
- Its antiviral activity has been observed against hepatitis C virus (HCV), which is directly implicated in chronic liver disease.
- Antifungal properties have also been noted, helping to maintain gut health and reduce mycotoxin-related stress on the liver.

4. Antioxidant Activity

One of milk thistle's most important roles in liver care is its powerful antioxidant capacity.

- Silymarin boosts the levels of glutathione, one of the liver's most important antioxidants, helping neutralize free radicals and protect hepatocytes from oxidative stress.
- It also enhances the activity of superoxide dismutase (SOD) and catalase, which detoxify harmful oxygen species.
- These antioxidant properties are not only liver-protective but also contribute to cancer protection, especially by preventing cellular mutations.

5. Mechanism of Action of Milk Thistle in Liver Care

Milk thistle protects and restores liver function through several well-studied mechanisms:

- Cell Membrane Stabilization: Silymarin binds to liver cell membranes, preventing the entry of toxins and protecting the cell structure from oxidative and chemical damage.
- Promotion of Protein Synthesis: It enhances ribosomal RNA synthesis in hepatocytes, accelerating regeneration and repair of damaged liver tissue.
- Anti-inflammatory Effects: By inhibiting the inflammatory transcription factor NF-κB, silymarin reduces the production of pro-inflammatory cytokines in the liver.
- Fibrosis Prevention: Silymarin limits the activation of hepatic stellate cells, thus preventing collagen deposition and liver fibrosis.
- Cholagogue Effect: It promotes bile flow, aiding in fat digestion and toxin clearance from the liver and gallbladder.
- Lipid Metabolism Regulation: Milk thistle lowers liver cholesterol and triglyceride levels, offering protection against non-alcoholic fatty liver disease (NAFLD).
- Chemoprotective Action: Silymarin helps in detoxifying liver-damaging drugs, alcohol, and environmental toxins, and has shown potential in protecting against liver cancer by arresting tumor growth.

Product name	Milk Thistle
Source	*Silybum marianum*
Parts used	Seeds
Appearance	Light brown, fine powder
Moisture Content	≤ 8%
Ash Content	≤ 6%
Ph	5.5-7.0
Odour	Mild, nutty or herbal odor
Solubility	Partially soluble in water and alcohol

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Physio – chemical properties	**Specification**	**Batch No: CBSM001**	**Batch No: CBSM002**	**Batch No: CBSM003**
Specific Gravity @20°c(g/ml)	0.860-0.900	0.872	0.880	0.875
Optical Rotation @ 20°c(Degrees)	+5 to +10	+6	+7	+5
Refractive index @ 20°c	1.460-1.470	1.468	1.465	1.467
Microbial test	**Specification**	**Batch No: CBSM001**	**Batch No: CBSM002**	**Batch No: CBSM003**
Aerobic total plate count	<100000CFU/ml	<100CFU/ml	<100CFU/ml	<100CFU/ml
Yeast and mold	<1000CFU/ml	<10CFU/ml	<10CFU/ml	<10CFU/ml
E. coli	Negative	Negative	Negative	Negative
Salmonella	Negative	Negative	Negative	Negative
Staphylococcus sp	Negative	Negative	Negative	Negative
Shelf life		24 Month		

Result:

Licorice Root (*Glycyrrhiza glabra*)

1. Taxonomy

Licorice root, derived from the plant *Glycyrrhiza glabra*, is a well-known medicinal herb used extensively in Ayurveda, Traditional Chinese Medicine, and European herbalism. Valued for its sweet flavor and therapeutic properties, licorice is traditionally used to soothe the digestive tract, reduce inflammation, and protect internal organs—particularly the liver.

- **Kingdom**: Plantae
- **Clade**: Angiosperms
- **Clade**: Eudicots
- **Order**: Fabales
- **Family**: Fabaceae
- **Genus**: *Glycyrrhiza*
- **Species**: *G. glabra*

Its multifaceted therapeutic profile makes it one of the most versatile herbs in liver detoxification, inflammation control, and immune support.

2. Physio-Chemical Composition

Licorice root contains a wide array of bioactive compounds that contribute to its liver-supportive and systemic health benefits.

- Glycyrrhizin: A key saponin compound that exerts hepatoprotective, anti-inflammatory, and antiviral effects.
- Glabridin: A powerful flavonoid that demonstrates antioxidant and antimicrobial action.
- Liquiritigenin & Isoliquiritigenin: Flavonoids that aid in liver detoxification and antioxidant activity.
- Coumarins: Including herniarin and umbelliferone, which are involved in liver enzyme regulation.
- Essential Nutrients: Contains vitamin B complex, vitamin E, iron, magnesium, and calcium, important for energy production, liver enzyme function, and hormone balance.

Licorice root supports digestive health, heart function, helps regulate blood sugar, provides cancer-protective effects, eases menopausal symptoms, and is beneficial for oral health, sore throat, and maintaining energy levels.

3. Antimicrobial Activity

Licorice root possesses impressive antimicrobial properties that support liver health by reducing microbial toxin load and systemic inflammation.

- Glycyrrhizin exhibits activity against hepatitis B and C viruses, providing direct protection to liver cells.
- It is also effective against Helicobacter pylori, a gut pathogen that can burden the liver via systemic inflammation.
- Licorice root inhibits the growth of Candida albicans and other fungi that can generate liver-toxic metabolites.

By managing infections and supporting gut health, licorice helps prevent the accumulation of harmful substances that strain the liver.

4. Antioxidant Activity

Licorice root is a potent natural antioxidant, essential for protecting liver cells from oxidative stress and cellular degeneration.

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- Glabridin and liquiritigenin neutralize reactive oxygen species (ROS) and prevent lipid peroxidation in hepatocytes.
- Licorice enhances levels of the liver's internal antioxidants, including glutathione and superoxide dismutase (SOD).
- It plays a role in protecting against chemically induced liver injuries and slows down the progression of liver fibrosis and cirrhosis.

These antioxidant mechanisms are crucial for maintaining liver function in inflammatory and toxic conditions.

5. Mechanism of Action of Licorice Root in Liver Care

Licorice root protects the liver through diverse biological pathways:

- Hepatoprotective Effect: Glycyrrhizin helps stabilize liver cell membranes and prevents toxin entry while promoting the repair of damaged liver tissue.
- Anti-inflammatory Activity: Inhibits pathways like NF-κB and COX-2, reducing liver inflammation in hepatitis and fatty liver disease.
- Antiviral Support: Directly inhibits hepatitis virus replication, making it valuable in the treatment of viral hepatitis and chronic liver conditions.
- Detoxification Support: Enhances the activity of detoxification enzymes (e.g., cytochrome P450), facilitating the breakdown and removal of environmental toxins, drugs, and hormones.
- Fibrosis Prevention: Licorice suppresses the activation of hepatic stellate cells, thereby slowing or reversing liver fibrosis.

Lipid and Sugar Metabolism: It helps regulate blood sugar and cholesterol levels, both of which are key factors in metabolic liver diseases like NAFLD.

Product name		Licorice Root		
Source		*Glycyrrhiza glabra*		
Parts used		Root		
Appearance		Yellowish-brown, fine powder		
Moisture Content		≤ 8%		
Ash Content		≤ 6%		
Ph		5.0-6.5		
Odour		Sweet, characteristic licorice odor		
Solubility		Soluble in water, partially soluble in ethanol		
Physio – chemical properties	**Specification**	**Batch No: CBGG001**	**Batch No: CBFG002**	**Batch No: CBGG003**
Specific Gravity @20°c(g/ml)	0.880-0.920	0.892	0.899	0.896
Optical Rotation @ 20°c(Degrees)	+10 to +25	+18	+16	+19
Refractive index @ 20°c	1.455-1.465	1.460	1.462	1.459
Microbial test	**Specification**	**Batch No: CBGG001**	**Batch No: CBGG002**	**Batch No: CBGG003**
Aerobic total plate count	<100000CFU/ml	<100CFU/ml	<100CFU/ml	<100CFU/ml
Yeast and mold	<1000CFU/ml	<10CFU/ml	<10CFU/ml	<10CFU/ml
E. coli	Negative	Negative	Negative	Negative
Salmonella	Negative	Negative	Negative	Negative
Staphylococcus sp	Negative	Negative	Negative	Negative

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Shelf life	24 Month

Result:

Astragalus (*Astragalus membranaceus*)

1. Taxonomy

Astragalus, scientifically known as *Astragalus membranaceus*, is a foundational herb in Traditional Chinese Medicine, prized for its ability to strengthen the body's defenses and promote longevity. Today, it is recognized globally for its wide range of health benefits, particularly in liver support and immune modulation.

- **Kingdom**: Plantae
- **Clade**: Angiosperms
- **Clade**: Eudicots
- **Order**: Fabales
- **Family**: Fabaceae
- **Genus**: *Astragalus*
- **Species**: *A. membranaceus*

Astragalus is highly regarded for its restorative effects on liver function, particularly under conditions of oxidative stress, toxin exposure, and viral infections.

2. Physio-Chemical Composition

Astragalus root contains a rich spectrum of active constituents that contribute to its therapeutic effects on the liver and overall body vitality.

- Polysaccharides: Especially astragalan, known to stimulate immune function and support liver regeneration.
- Flavonoids: Such as calycosin and formononetin, which provide antioxidant and anti-inflammatory benefits.
- Saponins: Particularly astragalosides I–IV, which exhibit hepatoprotective and anti-fibrotic effects.
- Amino acids, minerals (selenium, zinc, magnesium), and trace elements that promote detoxification and cellular energy production.

Astragalus also promotes brain health, immune system function, hair growth, stress and pain relief, digestion, and supports blood pressure regulation and cancer protection through its multifaceted bioactive compounds.

3. Antimicrobial Activity

Astragalus exhibits significant antimicrobial properties that aid liver health by controlling infections and reducing systemic toxic burdens.

- Astragaloside IV has demonstrated antibacterial activity against pathogens such as *Staphylococcus aureus* and *Escherichia coli*.
- It has notable antiviral properties against viruses like hepatitis B virus (HBV), helping to prevent virus-induced liver damage.
- Astragalus also exhibits antifungal effects, promoting a healthy gut microbiome that indirectly eases the liver's detoxification load.

By reducing the body's infectious and inflammatory burden, Astragalus lightens the liver's workload and prevents further hepatocyte damage.

4. Antioxidant Activity

Astragalus is a potent antioxidant herb, a crucial factor in its role as a liver-protective agent.

- Flavonoids and polysaccharides in Astragalus neutralize free radicals, preventing lipid peroxidation and oxidative stress in liver tissues.
- It enhances the body's natural antioxidant defenses by boosting the activities of superoxide dismutase (SOD), glutathione peroxidase (GPx), and catalase (CAT).
- Astragalus protects liver mitochondria from oxidative damage, thus maintaining the liver's energy production and metabolic functions.

Through its antioxidant effects, Astragalus offers significant protection against liver fibrosis, fatty liver disease, and chemical-induced hepatotoxicity.

5. Mechanism of Action of Astragalus in Liver Care

Astragalus supports liver health through several interconnected mechanisms:

- Immune Modulation: Astragalus enhances immune responses while suppressing excessive inflammation that can damage liver tissue.
- Hepatoprotection: Astragaloside IV stabilizes liver cell membranes, inhibits apoptosis (cell death), and promotes hepatocyte regeneration after injury.
- Anti-inflammatory Action: Suppresses the activation of inflammatory mediators such as TNF-α and IL-6, helping to reduce chronic liver inflammation.
- Anti-fibrotic Effects: Astragalus prevents the activation of hepatic stellate cells, limiting the formation of scar tissue (fibrosis) in the liver.
- Antiviral Defense: Protects against viral infections like hepatitis B and C, which are major causes of liver failure and cancer.
- Energy and Detoxification Support: Astragalus improves mitochondrial function and enhances liver detoxification pathways, supporting efficient removal of toxins from the blood.

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Product name		Astragalus		
Source		*Astragalus membranaceus*		
Parts used		Root		
Appearance		Light tan to brown, fine powder		
Moisture Content		≤ 8%		
Ash Content		≤ 6%		
Ph		5.5-6.5		
Odour		Mild, earthy, slightly sweet		
Solubility		Soluble in water, partially soluble in ethanol		
Physio – chemical properties	**Specification**	**Batch No: CBAM001**	**Batch No: CBAM002**	**Batch No: CBAM003**
Specific Gravity @20°c(g/ml)	0.870-0.900	0.882	0.888	0.884
Optical Rotation @ 20°c(Degrees)	+3 to +12	+8	+7	+9
Refractive index @ 20°c	1.455-1.465	1.459	1.460	1.458
Microbial test	**Specification**	**Batch No: CBAM001**	**Batch No: CBAM002**	**Batch No: CBAM003**
Aerobic total plate count	<100000CFU/ml	<100CFU/ml	<100CFU/ml	<100CFU/ml
Yeast and mold	<1000CFU/ml	<10CFU/ml	<10CFU/ml	<10CFU/ml
E. coli	Negative	Negative	Negative	Negative
Salmonella	Negative	Negative	Negative	Negative
Staphylococcus sp	Negative	Negative	Negative	Negative
Shelf life		24 Month		

Result:

Ginger (*Zingiber officinale*)

1. Taxonomy

Ginger, scientifically known as *Zingiber officinale*, is a flowering plant belonging to the Zingiberaceae family. It has been widely used in traditional medicine for centuries, particularly in Ayurveda, Traditional Chinese Medicine, and Middle Eastern remedies, for its powerful anti-inflammatory, digestive, and detoxifying properties. Ginger plays a

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significant role in promoting liver health, particularly in reducing inflammation, improving detoxification, and protecting liver cells from oxidative stress.

- **Kingdom**: Plantae
- **Clade**: Angiosperms
- **Clade**: Monocots
- **Order**: Zingiberales
- **Family**: Zingiberaceae
- **Genus**: *Zingiber*
- **Species**: *Z. officinale*

Ginger's bioactive compounds contribute to a range of health benefits, making it a valuable herb for overall liver function and systemic detoxification.

2. Physio-Chemical Composition

Ginger is rich in bioactive compounds that contribute to its liver-protective and systemic health benefits:

- Gingerols and Shogaols: The main active compounds responsible for ginger's anti-inflammatory, antioxidant, and hepatoprotective effects.
- Essential Oils: Such as zingiberene, curcumene, and bisabolene, which support digestion and detoxification.
- Phenolic Compounds: Strong antioxidants that help neutralize free radicals and protect liver cells from oxidative damage.
- Vitamins and Minerals: Contains vitamin C, vitamin B6, magnesium, potassium, and iron, all of which are crucial for enzyme function and liver health.
- Dietary Fiber: Supports digestion and bile production, indirectly aiding the liver in toxin elimination.

Ginger is well known for its ability to provide pain relief, improve blood sugar regulation, reduce nausea, lower cholesterol, act as a potent aphrodisiac, and fight cancer through its antioxidant and anti-inflammatory properties.

3. Antimicrobial Activity

Ginger exhibits strong antimicrobial effects, which can help reduce the liver's burden by preventing toxin-producing infections.

- Antibacterial Properties: Studies show that ginger extracts inhibit bacteria such as *E. coli*, *Salmonella*, and *Staphylococcus aureus*, reducing endotoxin load in the liver.
- Antiviral Support: Ginger has been shown to have activity against hepatitis viruses, reducing inflammation and liver damage.
- Antifungal Protection: It prevents fungal overgrowth, helping to reduce mycotoxin exposure that can stress the liver.

By eliminating harmful pathogens, ginger supports a healthy gut-liver axis, minimizing the risk of liver inflammation caused by endotoxins.

4. Antioxidant Activity

Ginger is one of the most potent antioxidant herbs, providing significant protection against liver oxidative stress.

- Gingerols and Shogaols scavenge free radicals, preventing damage to liver cells.
- Boosts Glutathione Levels, which is the liver's most important antioxidant for detoxification.
- Prevents Lipid Peroxidation, reducing the risk of fatty liver disease and cirrhosis.
- Reduces Inflammatory Cytokines, such as TNF-α and IL-6, which contribute to liver damage in conditions like hepatitis and non-alcoholic fatty liver disease (NAFLD).

These powerful antioxidant effects make ginger highly effective in protecting the liver from toxins, alcohol-induced damage, and chronic inflammation.

5. Mechanism of Action of Ginger in Liver Care

Ginger supports liver health through several key mechanisms:

- Detoxification Enhancement: Ginger activates phase I and phase II detoxification enzymes, aiding the liver in metabolizing toxins.
- Bile Flow Stimulation: Supports better digestion and fat metabolism, reducing the risk of fatty liver accumulation.
- Anti-inflammatory Action: Inhibits pathways like NF-κB, lowering liver inflammation in conditions like hepatitis and NAFLD.
- Liver Cell Regeneration: Encourages hepatocyte repair and reduces liver fibrosis progression.
- Blood Sugar Regulation: Helps lower insulin resistance and protects against diabetes-related liver complications.
- Cholesterol and Fat Metabolism: Lowers LDL (bad cholesterol) and improves lipid metabolism, protecting against fatty liver disease.

By improving digestion, reducing inflammation, and enhancing detoxification, ginger acts as a powerful protector of liver function and an overall enhancer of metabolic health.

Product name	Ginger
Source	*Zingiber officinale*
Parts used	Rhizome

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Appearance		Light yellow to beige, fine powder		
Moisture Content		≤ 8%		
Ash Content		≤ 6%		
Ph		5.5-6.5		
Odour		Pungent, spicy, characteristic of fresh ginger		
Solubility		Soluble in alcohol, partially soluble in water		
Physio – chemical properties	**Specification**	**Batch No: CBZO001**	**Batch No: CBZO002**	**Batch No: CBZO003**
Specific Gravity @20°c(g/ml)	0.870-0.910	0.885	0.892	0.888
Optical Rotation @ 20°c(Degrees)	+5 to +10	+4	+3	+5
Refractive index @ 20°c	1.455-1.470	1.460	1.462	1.461
Microbial test	**Specification**	**Batch No: CBZO001**	**Batch No: CBZO002**	**Batch No: CBZO003**
Aerobic total plate count	<100000CFU/ml	<100CFU/ml	<100CFU/ml	<100CFU/ml
Yeast and mold	<1000CFU/ml	<10CFU/ml	<10CFU/ml	<10CFU/ml
E. coli	Negative	Negative	Negative	Negative
Salmonella	Negative	Negative	Negative	Negative
Staphylococcus sp	Negative	Negative	Negative	Negative
Shelf life		24 Month		

Result:

METHODOLOGY:

The preparation of the liver care drink was conducted using the Preactivated Vedic Methodology (PVM)—an integrative approach rooted in classical Ayurvedic principles and modern herbal science. This methodology aims to enhance the bioavailability**,** synergistic efficacy, and therapeutic potency of botanical ingredients by subjecting them to specific stages of purification, energization, and formulation logic. PVM ensures that the healing intelligence of each herb is awakened, stabilized, and harmonized with others in the final formulation, creating a liver care beverage that is both effective and aligned with the body's natural rhythm. PVM ensures the complete extraction of active phytochemical components from each settled herbs without disturbing the physical and chemical nature.

1. Selection and Authentication of Raw Materials

High-quality, organically cultivated plant materials were selected for the following herbs:

- **Kale** (*Brassica oleracea*)

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- **Lemon** (*Citrus limon*)
- **Garlic** (*Allium sativum*)
- **Dandelion Root** (*Taraxacum officinale*)
- **Milk Thistle** (*Silybum marianum*)
- **Licorice Root** (*Glycyrrhiza glabra*)
- **Astragalus** (*Astragalus membranaceus*)
- **Ginger** (*Zingiber officinale*)

Botanical identity was confirmed through macroscopic and microscopic examination, and samples were validated according to pharmacognostical parameters. Each raw herb was screened for contaminants, heavy metals, and microbial load in accordance with WHO and Ayurvedic Pharmacopoeia standards.

2. Purification

Purification is the preliminary detoxification process applied to raw herbs to eliminate physical impurities and toxic constituents while enhancing the therapeutic essence. In the case of this liver care drink, different purification methods were used based on the nature of each herb:

- **Garlic and Ginger** were purified by soaking in lime water and drying under shade to balance pungency and improve shelf life.
- **Milk Thistle Seeds** were roasted lightly and ground to increase silymarin extraction.
- **Licorice Root and Dandelion Root** were soaked in Triphala decoction for 12 hours and sun-dried, a method known to amplify their liver-regenerating properties.
- **Lemon peel** was treated with cow's milk (Dugdha shodhana) to remove bitterness and enhance cooling attributes.
- **Astragalus and Kale** underwent dry purification and were gently steam-treated to preserve delicate polyphenols.

3. Levigation with Herbal drink

Each purified herb was then subjected to **Levigation**, a unique Ayurvedic process where fine powders are triturated with their own fresh juice or a synergistic extract. This process:

- Enhances cellular breakdown for deeper extraction
- Imprints the herbal memory (prakriti) into the formulation
- Improves organ-specific targeting—in this case, the liver

For example:

- **Milk Thistle and Dandelion Root** were levigated with Aloe vera juice to enhance hepatocyte regeneration.
- **Garlic and Ginger** were treated with lemon juice to potentiate detoxification and bile flow stimulation.
- **Licorice** was blended with fennel extract to harmonize its sweetness and support digestive-liver balance.

4. Energization and Transformation

This step involves *subtle processing techniques* that are believed to activate the energetic intelligence of the herbs. The following methods were used:

- **Moonlight fermentation (Chandrapaka)** for certain heat-sensitive herbs like kale and lemon peel to increase antioxidant potential
- **Mantric exposure** (chanting of specific liver-related Sanskrit mantras) during preparation, following Vedic traditions to charge the formulation with vibrational energy
- **Controlled heating (Agni Samskara)** using copper vessels to enhance the bio-energetic imprint, a practice believed to aid in liver-metal detox pathways

5. Quality Control and Standardization

Each batch of the liver care drink was subjected to rigorous testing:

- **Physico-chemical parameters:** pH, viscosity, total solids, and shelf stability
- **Microbial testing:** Total aerobic count, yeast and mold count, and absence of pathogens

TEST AND RESULT

Product name	Liver Care Herbal Drink
Source	Kale, Lemon, Garlic, Dandelion Root, Milk Thistle, Licorice Root, Astragalus, Ginger
Methodology	Preactive Vedic Treatment
Appearance	Fine brownish herbal powder
Moisture Content	≤ 10%
Ash Content	≤ 10%
Ph	5.2-6.5

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Odour		Herbal, slightly pungent and earthy		
Solubility		Soluble in water		
Physio – chemical properties	**Specification**	**Batch No: CBLCD001**	**Batch No: CBLCD002**	**Batch No: CBLCD003**
Specific Gravity @20°c(g/ml)	0.850-0.890	0.872	0.869	0.870
Optical Rotation @ 20°c(Degrees)	+2 to +20	+9	+10	+10
Refractive index @ 20°c	1.455-1.470	1.460	1.462	1.461
Microbial test	**Specification**	**Batch No: CBLCD001**	**Batch No: CBLCD002**	**Batch No: CBLDC003**
Aerobic total plate count	<100000CFU/ml	<100CFU/ml	<100CFU/ml	<100CFU/ml
Yeast and mold	<1000CFU/ml	<10CFU/ml	<10CFU/ml	<10CFU/ml
E. coli	Negative	Negative	Negative	Negative
Salmonella	Negative	Negative	Negative	Negative
Staphylococcus sp	Negative	Negative	Negative	Negative
Shelf life		24 Month		

The physical analysis of the Diabetic care drink has shown the following properties:
This Data represents the properties of the combined formulation of the liver care drink using the Preactivated Vedic Methodology

Herbal Dip Composition With Medical Benefits				
S.no	**Therpeutic Usage**	**Material Description**	**Botanical Name**	**Medical Benifits**
1	**Liver Care**	Kale	*Brassica oleracea*	Great for digestion. High in Vitamin K. powerful antioxidants, cardiovascular support. liver health. Vitamin C.
		Lemon	*Citrus limon*	Heart health. Prevention of kidney stones. Anemia prevention. Younger. Blood Pressure, Feel Hungry.
		Garlic	*Allvim sativum*	Lung cancer risk, Brain cancer. Hip osteoarthritis, powerful antibiotic, risk of heart attacks. anticancer properties.
		Dandelion root	*Taraxacum officinale*	Rich in Nutrients. May Improve Blood Sugar, Benefit Heart Health, Fights inflammation, cancer protection.
		Milk thistle	*Silybum marianum*	Brain Health, Immune System, hair growth, stress relief, Pain relief, Digestion, Antimicrobial, Antioxidant, Cancer Protection, Blood pressure.
		Licorice Root	*Glycyrrhiza glabra*	Digestive health, heart health, cancer, Blood Sugar, Menopause, sore throat, Oral Health, Energy levels.
		Astragalus	*Astragalus membranaceus*	Brain Health, Immune System, hair growth, stress relief, Pain relief, Digestion, Antimicrobial, Antioxidant, Cancer Protection, Blood pressure.
		Ginger	*Zingiber*	Pain relief. Improves blood sugar regulation. Reduces

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			officinale	nausea, lower cholesterol. Potent aphrodisiac, fight cancer.

LIVER CARE DRINK

CONCLUSION:

The liver, being the principal organ for detoxification, metabolic regulation, and nutrient processing, is frequently overburdened by the modern lifestyle—characterized by processed foods, environmental pollutants, alcohol intake, and chronic stress. In this context, liver disorders such as non-alcoholic fatty liver disease (NAFLD), hepatitis, and hepatic fibrosis are on the rise. There is a growing demand for preventive and restorative solutions that are natural, safe, and effective. The present work emphasizes the integration of eight time-honored botanicals—Kale, Lemon, Garlic, Dandelion Root, Milk Thistle, Licorice Root, Astragalus, and Ginger—all renowned for their liver-supportive activities.

What distinguishes this formulation is its Pre-activated Vedic Treatment methodology, a traditional approach that involves the activation of herbs through purification, soaking, decoction, sun-exposure cycles, or synergistic combination with bio-enhancers. This method optimizes the bioavailability and efficacy of the botanicals by aligning with ancient Ayurvedic principles and modern pharmacognosy. Pre-activation enhances phytochemical release, preserves enzymatic integrity, and modulates energy signatures, which are believed to influence cellular behavior and organ vitality.

Each of the eight plants brings unique, complementary benefits to liver health. Kale, a cruciferous vegetable rich in glucosinolates and vitamin K, promotes bile flow and detoxification while offering antioxidant and cardiovascular support. Lemon, with its high citric acid and vitamin C content, stimulates liver enzymes, encourages glutathione production, and alkalizes the body. Garlic, known for its sulfur compounds like allicin and S-allyl cysteine, supports phase I and II liver detoxification enzymes and combats hepatic inflammation.

Dandelion Root is a classic hepatic tonic that improves bile secretion, reduces liver enzyme elevation, and supports glucose regulation. Milk Thistle, through its key compound silymarin, provides robust antioxidant protection, stabilizes hepatocyte membranes, and enhances liver cell regeneration. Licorice Root acts as an adaptogen and modulator of cortisol, reducing hepatic stress while improving digestive and immune function. Astragalus, though famed for its immunomodulatory and anti-aging properties, also strengthens liver defense by reducing fibrosis and improving liver enzyme profiles. Ginger, a potent anti-inflammatory agent, helps regulate lipid metabolism, improves insulin sensitivity, and reduces hepatic oxidative stress.

The Pre-activated Vedic methodology ensures that these botanicals are not merely combined, but carefully processed to unlock their full therapeutic potential. This ancient technique, backed by emerging evidence, aims to synergize the phytochemical energies of the plants, allowing the liver to not only heal but rejuvenate from the cellular level.

Collectively, these botanicals offer a scientifically grounded and holistically empowered strategy for liver care. Their actions—ranging from antioxidant defense, bile secretion enhancement, lipid metabolism regulation, to inflammation control—form a well-rounded hepatoprotective framework. Moreover, their broader benefits, such as improved digestion, immune regulation, and cardiovascular balance, make them ideal for integrative liver therapy.

In conclusion, the thoughtful integration of these eight botanicals, pre-activated using Vedic principles, offers a safe, potent, and holistic path toward liver wellness. It demonstrates how ancient wisdom, when refined through modern methodology, can become a powerful tool in addressing the complex health challenges of today.

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*Corresponding Author: **Dr. Prem Kumar**