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LIVER PROTECTION AND HERBAL HEALING: NATURAL ALTERNATIVES FOR HEPATITIS B THERAPY

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ABSTRACT

This review provides a comprehensive evaluation of the efficacy of herbal medicines in the management of hepatitis B virus (HBV) infection. Chronic hepatitis B is a global health challenge, often requiring lifelong treatment. While conventional antiviral therapies, such as nucleoside analogues and interferon-based treatments, are effective in suppressing viral replication, they may be associated with side effects and high costs. Herbal medicines have gained attention as complementary or alternative therapies, with several herbs showing promise in alleviating liver damage, inhibiting viral replication, and modulating immune responses. This review synthesizes findings from clinical trials, meta-analyses, and in-vitro studies on herbs such as, *Glycyrrhiza glabra* (licorice), and *curcuma longa*, *Silybum marianum* among others. The mechanisms of action include antioxidant, anti-inflammatory, and antiviral effects, as well as liver cell regeneration. However, variability in study designs, inconsistent methodologies, and limited sample sizes limit the generalizability of these results. While some herbal medicines have demonstrated beneficial effects as adjunct therapies to conventional treatments, concerns about quality control, toxicity, and herb-drug interactions persist. The review concludes by recommending rigorous, large-scale clinical trials to confirm efficacy and safety, and to establish standardized guidelines for integrating herbal medicines into hepatitis B treatment protocols.

KEYWORDS: Hepatitis, Anti-viral, Infection, Herbal Plants, Traditional treatment.

INTRODUCTION

Hepatitis a general term referring to inflammation of the liver, may result from various causes, both infectious (e.g., viral, bacterial, fungal, and parasitic organisms) and non-infectious (e.g., alcohol, drugs, autoimmune diseases, and metabolic diseases); this article focuses on viral hepatitis, which accounts for more than 50% of cases of acute hepatitis in the United States, primarily in the emergency department setting. In the United States, viral hepatitis is most commonly caused by hepatitis A virus (HAV), hepatitis B virus (HBV), and hepatitis C virus (HCV). These three viruses can all result in acute disease with symptoms of nausea, abdominal pain, fatigue, malaise, and jaundice.[1] Additionally, acute infection with HBV and HCV can lead to chronic infection. Patients who are chronically infected may go on to develop cirrhosis and hepatocellular carcinoma (HCC). Furthermore, chronic hepatitis carriers remain infectious and may transmit the disease for many years.[2] Other hepatotropic viruses known to cause hepatitis include hepatitis D virus (HDV) and hepatitis E virus (HEV). However, the term hepatotropic is itself a misnomer. Infections with hepatitis viruses, especially HBV and HBC, have been associated with a wide variety of extrahepatic manifestations. Infrequent causes of viral hepatitis include adenovirus, cytomegalovirus (CMV), Epstein-Barr virus (EBV) and, rarely, herpes simplex virus (HSV). Other pathogens (e.g., virus SEN-V) may account for additional cases of nonA/non-E hepatitis.[1,2] Viral hepatitis has emerged as a major public health problem throughout the world affecting several hundreds of millions of people. Viral hepatitis is a cause of considerable morbidity and mortality in the human population, both from acute infection and chronic sequelae which include, in the case of hepatitis B, C and D, chronic active hepatitis and cirrhosis. Hepatocellular carcinoma which is one of the ten most common cancers worldwide, is closely associated with hepatitis B, and at least in some regions of the world with hepatitis C virus. The hepatitis viruses include a range of unrelated and often highly unusual human pathogens.[2,3]

CLASSIFICAION AND TREATMENT

Types of hepatitis

Hepatitis A: Hepatitis A is mostly a food-borne illness and can be spread through contaminated water and unwashed food. It is the easiest to transmit, especially in children, but is also the least likely to damage the liver and is usually mild and is completely resolved within six months.

Cause: Hepatitis A virus

Prevention: Vaccine available; improved sanitation and hygiene practices

Prognosis: Acute but self-limiting; rarely causes chronic disease

Hepatitis B: Hepatitis B can be transmitted through exposure to contaminated blood, needles, syringes or bodily fluids and from mother to baby. It is a chronic disorder and, in some cases, may lead to long-term liver damage, liver cancer and cirrhosis of the liver after many years of carrying the virus.

Cause: Hepatitis B virus

Prevention: Vaccine available

Prognosis: Can become chronic and lead to liver cirrhosis or liver cancer

Hepatitis C

Hepatitis C is only transmitted through infected blood or from mother to newborn during childbirth. It too can lead to liver cancer and cirrhosis in the long term.

Cause: Hepatitis C virus

Prevention: No vaccine, but avoid risky behaviours (e.g., needle sharing)

Prognosis: Often becomes chronic; can lead to cirrhosis or liver cancer. Effective antiviral treatments are available.

Hepatitis D

Hepatitis D is only found in people who are also infected with hepatitis B.

Cause: Hepatitis D virus.

Prevention: HBV vaccination also prevents HDV infection.

Prognosis: Can worsen HBV infection; higher risk of severe liver disease.

Hepatitis E

Cause: Hepatitis E virus

Transmission: Fecal-oral route, often through contaminated water.

Prevention: Improved sanitation; vaccine available in some countries.

Prognosis: Usually acute; can be severe in pregnant women.[4,5]

Treatment of hepatitis B

Healthcare providers have found that current medications for hepatitis B are most effective for people who show signs of active liver disease. This may be only 25% of people diagnosed with chronic hepatitis B, according to the World Health Organization (WHO).

Current medications help boost your immune system and slow down the rate at which the virus reproduces itself. They don't kill the virus completely, but they can help keep your liver as healthy as possible for as long as possible.

Immune modulator drugs: Immune modulators, also known as interferons, include peginterferon alfa-2a and interferon alfa-2b. These are synthetic versions of the antibodies our bodies produce to fight infections. They're given by injection for a course of six to 12 months. They're prescribed for some adults and as a first-line treatment for children.

Oral antiviral medications: Antivirals taken by mouth are the most potent medications for suppressing HBV. Your provider might recommend one or several based on who you are and how you respond. First-line antivirals include tenofovir disoproxil or tenofovir alafenamide and entecavir. Most people who begin these medications will continue them for life.

Lifestyle changes Whether or not you're taking medication for hepatitis B, you'll need to take steps to protect your liver from further harm throughout your life. Healthcare providers particularly recommend that you avoid alcohol and maintain a healthy, balanced diet. Alcohol use and metabolic factors such as a high BMI and high triglycerides are two of the leading causes of liver inflammation outside of infection. When you already have chronic hepatitis, it's best to limit alcohol, sugar and fat intake to minimize inflammation.[11]

HERBAL PLANTS

1. MILK THISTLE

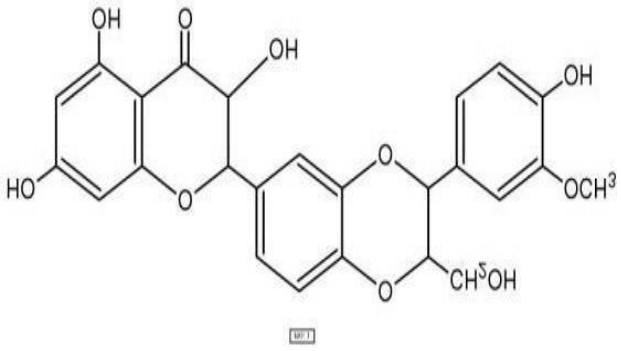
Milk thistle (Silybum marianum)[18], commonly known as Holy Thistle, Saint Mary Thistle, or Blessed Thistle, belongs to the family Asteraceae. The plant's seeds, leaves, and roots are used medicinally, with the seeds being the richest source of biologically active compounds. The seeds contain flavonolignans, primarily the silymarin complex, which includes silybinin A and B (the most abundant and active), silychristin, silydianin, and isosilybin A and B. Other constituents include flavonoids (quercetin, taxifolin), fatty acids (linoleic, oleic, palmitic), proteins (20–30% by weight), sterols (β-sitosterol, campesterol), tannins, phenolic acids (gallic and vanillic acids), and essential oils with terpenes like caryophyllene.

The leaves contain similar but lower concentrations of these compounds, including silymarin, flavonoids such as kaempferol and quercetin, bitter compounds that aid digestion, minerals like calcium and potassium, chlorophyll, and mucilage, a polysaccharide with soothing

properties. The roots, though less studied, contain trace amounts of silymarin, polysaccharides with immune-modulating properties, phenolic acids (caffeic and ferulic acids), inulin (a prebiotic fiber), and tannins with mild astringent effects.

Milk thistle is renowned for its hepatoprotective properties, supporting liver health and detoxification. It exhibits antioxidant and anti-inflammatory effects, improves insulin sensitivity, reduces cholesterol and triglycerides, and supports weight loss. The plant is beneficial for managing diabetes, metabolic syndrome, and preventing gallstone formation. It supports gallbladder function and protects the skin from UV radiation damage while promoting wound healing. Additionally, it may enhance chemotherapy tolerance by protecting healthy cells, aid in cancer prevention, and help manage autoimmune conditions by reducing excessive immune activation. Milk thistle is also used in the treatment of hepatitis, viral infections, and digestive issues, including indigestion, bloating, and mild constipation.[19]

1.1 MILK THISTLE



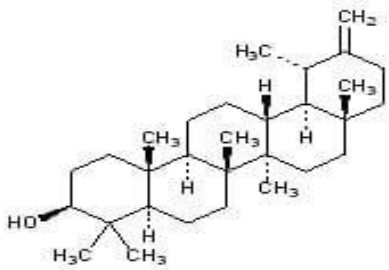
1.2 SILYBININ A

2. DANDELION

Dandelion (Taraxacum officinale)[20], commonly known as Face Clock, Pee-a-bed, or Wet-a-bed, belongs to the family Asteraceae. The plant's flowers, leaves, and roots are its primary biological sources and have been traditionally used for various medicinal and health benefits. Chemically, dandelion is rich in phenolic compounds, including flavonoids such as luteolin and apigenin, and phenolic acids, which possess antioxidant properties. Terpenes, such as taraxasterol, contribute potential anti-inflammatory effects, while chicoric acid provides antioxidant and immune-boosting benefits. The plant is also a source of inulin, a soluble fiber known to support digestion and gut health, and saponins, which may help lower cholesterol and boost the immune system.

Dandelion is widely used to support digestive health by stimulating appetite and aiding digestion. It is also beneficial for kidney function and may help reduce inflammation, supporting joint health. Additionally, the plant is valued for its ability to soothe skin irritations and promote overall skin health. Its role in liver function and detoxification further highlights its therapeutic potential. Beyond medicinal applications, dandelion has cosmetic uses and is rich in nutrients, making it an excellent natural fertilizer for gardens. These diverse properties make dandelion a versatile plant in both traditional and modern medicine.

1.3 DANDELION



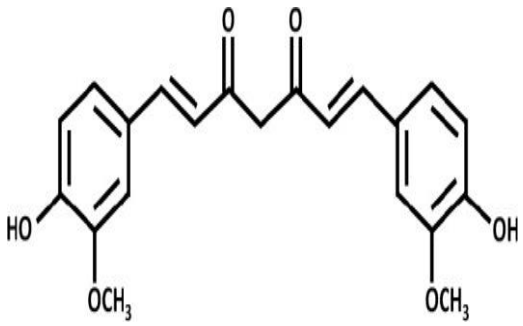
1.4 TARAXASTEROL

3. TURMERIC

Turmeric, commonly known as Haldi, Indian Saffron, or Curcuma[25], belongs to the Zingiberaceae family. It is derived from the dried and fresh rhizome of Curcuma longa. The plant is a rich source of chemical constituents, including volatile oils (such as cineol, zingiberene, and sesquiterpenes), starch, resins, and curcuminoids. The primary active compound, curcumin, constitutes 50–60% of the curcuminoid content. Curcuminoids are polyphenolic compounds responsible for turmeric's yellow color and biological activities. The curcuminoids primarily consist of curcumin (71.5%), desmethoxycurcumin (19.4%), and bisdemethoxycurcumin (9.1%). Additionally, turmeric contains over 235 identified compounds, including diarylheptanoids, monoterpenes, sesquiterpenes, diterpenes, triterpenoids, sterols, and alkaloids.[25,26,27]

Curcumin exhibits a wide range of therapeutic properties, including antioxidant, anti-inflammatory, anticancer, hypolipidemic, antiseptic, and anti-rheumatic activities. It has applications in treating Alzheimer's disease, aging, acne, and psoriasis. Turmeric is traditionally used for wound healing and as a flavoring and coloring agent in food, cosmetics, ointments, lotions, and creams.[28]

1.5 TURMERIC



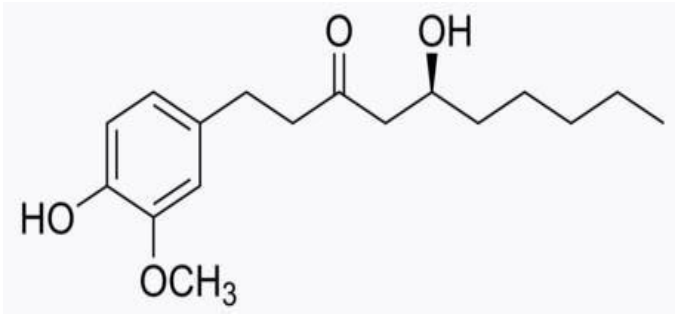
1.6 CURCUMIN

4. GINGER

Ginger, commonly known as Ginger Root, Black Ginger, or Zingiber Rhizome, is a member of the Zingiberaceae family. It is obtained from the dried rhizomes of Zingiber officinale. Its key constituents include 1–2% volatile oils, 5–8% pungent resinous mass, and starch. The volatile oil contributes to ginger's aromatic odour, while the yellowish oily compound gingerol is responsible for its pungency and health benefits. The primary bioactive compound, 6-gingerol, provides its flavour and therapeutic properties. Other compounds include shogaols (formed during drying or cooking), zingiberene, sesquiterpenes, phenolic compounds, vitamins (like vitamin C and B vitamins), and minerals such as magnesium and potassium.[29]

Ginger is widely used for gastrointestinal conditions, including motion sickness, morning sickness, colic, gas, diarrhea, irritable bowel syndrome (IBS), and nausea caused by cancer treatment or surgery. It is also employed for respiratory ailments such as cough, bronchitis, and upper respiratory tract infections. Additional applications include pain relief for rheumatoid arthritis, osteoarthritis, and menstrual pain, as well as for managing migraines, diabetes, chest pain, and low back pain. Ginger is known to act as a diuretic, stimulate breast milk production, and promote sweating.[30,31,32]

1.7 GINGER



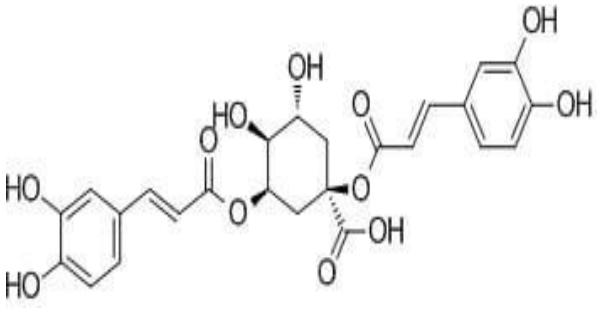
1.8 GINGEROLE

5. ARTICHOKE

Artichoke, commonly known as French artichoke, globe artichoke, or green artichoke, belongs to the Asteraceae family. It is obtained from Cynara scolymus L. and is valued for its rich chemical composition. The key constituents include cynarine, a phenolic compound known for its liver-protective and cholesterol-lowering effects, and silymarin, a complex of flavonoids with antioxidant properties. Other notable compounds include chlorogenic acid (an antioxidant with anti-inflammatory effects), inulin (a soluble fiber that supports gut health), and various flavonoids such as quercetin and luteolin. Artichoke is also a source of vitamins C, K, and several B vitamins (like folate), along with essential minerals such as magnesium, potassium, and iron.[34]

Artichokes are primarily used to support digestive health, stimulate bile production, and promote liver detoxification. They may also help in cholesterol management, weight control, and blood sugar regulation. Additionally, their antioxidant properties combat oxidative stress, contributing to overall health.[35,36]

1.9 ARTICHOKE



1.10 CYNARIN

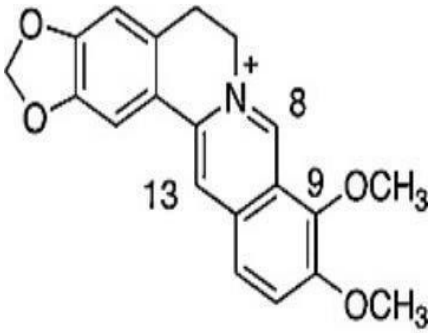
6. BARBERRY

Barberry, also known as Oregon grape or holly barberry, belongs to the Berberidaceae family. It is derived from the roots, bark, and berries of Berberis vulgaris. Its chemical composition is dominated by berberine, a prominent alkaloid with antimicrobial, anti-inflammatory, and blood sugar-regulating properties. Other constituents include hydrastine and berberastine (alkaloids), phenolic compounds, flavonoids, tannins, and saponins. These compounds collectively contribute to barberry's therapeutic effects.[37]

Barberry is widely used for digestive health, treating conditions such as diarrhea, constipation, and indigestion by stimulating bile production. Its antimicrobial properties make it effective against bacterial, fungal, and viral infections. Additionally, barberry supports blood sugar regulation, liver detoxification, and immune function. It also finds application in managing skin conditions such as psoriasis and acne.[38,39]

Beyond medicinal uses, barberry is valued as a flavoring agent in Persian cuisine, where its berries (known as "zereshk") add a tangy flavor to dishes. The berries are also used to prepare preserves, jams, herbal teas, and even natural dyes from the bark and roots. Barberry shrubs are frequently used as ornamental plants due to their appealing foliage and vibrant berries.[39]

1.11 BARBERRY

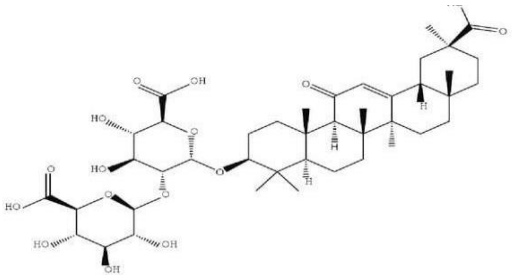


1.12 BERBERINE

7. LICORICE ROOT

Licorice root, commonly known as sweet root, is derived from the plant Glycyrrhiza glabra, which belongs to the family Fabaceae.[40] The root contains several bioactive compounds, including glycyrrhizin, a compound about 50 times sweeter than sucrose, known for its anti-inflammatory, immune-boosting, and hepatoprotective properties. Other key constituents include liquiritin, a flavonoid glycoside with antioxidant and gastrointestinal benefits, and licochalcone, a flavonoid with antibacterial and anti-inflammatory effects. Glycyrrhetinic acid, a metabolite of glycyrrhizin, also exhibits hepatoprotective properties, while phenolic compounds and saponins contribute to licorice's antioxidant and immunomodulatory effects. Medicinally, licorice root is widely recognized for supporting digestive health by alleviating conditions like heartburn, ulcers, and gastritis, as well as for its anti-inflammatory properties that benefit respiratory conditions such as bronchitis. It also supports immune function, regulates hormones like cortisol, and is commonly used in skincare for its soothing effects. Additionally, licorice serves as a natural stress reliever and flavouring agent.[41,42,43]

1.13 LICORICE ROOT

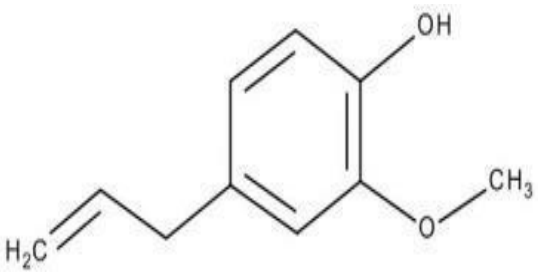


1..14 GLYCYRRHIZIN

8. HOLY BASIL

Holy basil, or Ocimum sanctum (commonly known as Tulsi), belongs to the family Lemnaceae. Its leaves are rich in bioactive compounds, such as essential oils including eugenol, linalool, and camphor, which contribute to its antiseptic, calming, and therapeutic properties. Other key constituents include flavonoids like apigenin and orientin, phenolic compounds such as rosmarinic acid, and triterpenes like ursolic acid, all of which exhibit antioxidant and anti-inflammatory effects.[42] Holy basil is classified as an adaptogen, helping the body manage stress while promoting mental balance. It supports immune health due to its antibacterial, antiviral, and antifungal properties and reduces inflammation, making it beneficial for conditions like arthritis. In addition, it aids respiratory health, improves digestion, and has shown potential in regulating blood sugar levels and improving insulin sensitivity. It is also widely used in skin health applications, herbal teas, and as a culinary ingredient for its flavor and health benefits.[44]

1.15 HOLY BASIL



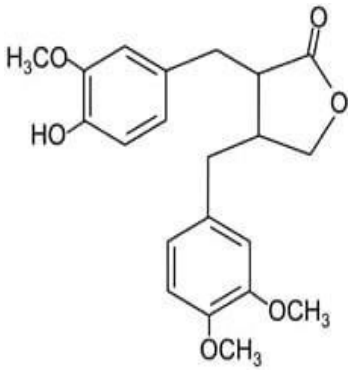
1.16 EUGENOL

9. BURDOCK ROOT

Burdock root, derived from Arctium lappa, a biennial plant of the Asteraceae family, is known for its detoxifying and medicinal properties.[45] Its chemical composition includes chicoric acid, lignans (arctigenin and arctiin), flavonoids (quercetin and kaempferol), tannins, and essential oils, as well as minerals like potassium and magnesium and vitamins such as vitamin C. These compounds collectively contribute to burdock root's antioxidant, anti-

inflammatory, and therapeutic properties. Traditionally, it is used for detoxification, particularly for cleansing the liver and purifying the blood. Its inulin content supports gut health, regulates blood sugar levels, and promotes healthy digestion. Burdock root also aids in treating inflammatory conditions, including arthritis and various skin disorders like acne, eczema, and psoriasis. Furthermore, it supports hormonal balance, assists in regulating menstrual cycles, and is frequently used in hair care products for its potential to promote scalp and hair health.[46,47,48]

1.17 BURDOCK ROOT



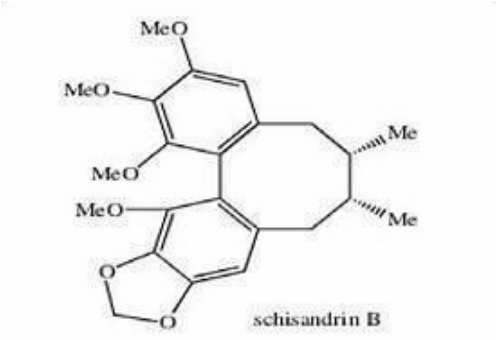
1.18 ARCTIGENIN

10. SCHISANDRA

Schisandra, commonly known as Magnolia vine, is derived from the berries of Schisandra chinensis, which belongs to the family Schisandraceae.[49] The berries are rich in bioactive compounds, including schisandrin, a lignan with potent antioxidant properties that supports liver health, and schisandrol, which exhibits anti-inflammatory and adaptogenic effects. Schisantherin, another key component, promotes vitality and overall wellness. Additionally, the berries contain essential oils, flavonoids, tannins, and a variety of vitamins and minerals, all of which contribute to their therapeutic potential. Schisandra is classified as an adaptogen, aiding the body in managing stress and improving resilience. It is well-known for its hepatoprotective properties, supporting liver detoxification and function. The berries are also a rich source of antioxidants, protecting against oxidative stress and free radical damage. Schisandra has been shown to enhance physical performance, stamina, and energy levels, as well as support cognitive function by improving focus and mental clarity. Digestive health may benefit from Schisandra, as the berries help alleviate gastrointestinal issues.[50] Moreover, their antioxidant and anti-inflammatory properties make Schisandra extracts a popular ingredient in skincare formulations. Beyond its medicinal uses, dried Schisandra

berries are brewed into herbal teas and used as a flavouring agent in jams, jellies, and sauces due to their unique flavour profile.[51,52]

1.19 SCHISANDRA



1.20 SCHISANDRIN B

DISCUSSION

Herbal medicines have gained significant attention as potential therapeutic agents for managing hepatitis B due to their antiviral, hepatoprotective, and immune-modulating properties. Various plant-derived compounds, including polyphenols, flavonoids, alkaloids, and saponins, have demonstrated inhibitory effects on the hepatitis B virus (HBV) by targeting multiple stages of its life cycle. For instance, Phyllanthus niruri, commonly known as the stone breaker, has been extensively studied for its ability to suppress HBV DNA replication and reduce viral load by inhibiting the polymerase enzyme. Glycyrrhiza glabra (licorice) contains glycyrrhizin, which exhibits antiviral activity by interfering with HBV gene expression and modulating immune responses to enhance viral clearance. Additionally, Andrographis paniculata, rich in andrographolide, has shown promising results in reducing liver inflammation and oxidative stress, thereby protecting hepatocytes from damage. Compared to conventional antiviral therapies such as nucleoside analogs and interferons, herbal medicines may offer a complementary or alternative approach with potentially fewer side effects and better tolerability. However, despite their traditional use and preliminary efficacy, rigorous clinical studies and pharmacokinetic evaluations are necessary to determine their safety, optimal dosages, and long-term effects in HBV treatment.

CONCLUSION

Natural remedies hold potential as complementary approaches in the management of hepatitis B by supporting liver health, alleviating symptoms, and enhancing immune function. While several herbs, vitamins, and dietary supplements have demonstrated antiviral and hepatoprotective properties, their efficacy and safety must be validated through well-designed

clinical studies. These remedies should not replace conventional antiviral therapies but can be integrated to improve patient outcomes, reduce side effects, and enhance quality of life. For optimal results, healthcare professionals must guide their use, considering potential interactions with standard treatments and individual patient needs.

CONFLICT OF INTEREST

The authors have no conflicts of interest regarding this investigation**.**

ACKNOWLEDGMENTS:

We are thankful to Dr. Subhash University for providing guidance and support for this review work.

ABBREVIATION

HBV – Hepatitis B Virus

HCV – Hepatitis C Virus

HAV – Hepatitis A Virus

HDV – Hepatitis D Virus

HEV – Hepatitis E Virus

HCC – Hepatocellular Carcinoma

ALT – Alanine Aminotransferase

AST – Aspartate Aminotransferase

ROS – Reactive Oxygen Species

NF-κB – Nuclear Factor Kappa B

MAPK – Mitogen-Activated Protein Kinase

TNF-α – Tumor Necrosis Factor-alpha

IL – Interleukin

IFN-γ – Interferon-gamma

HBeAg – Hepatitis B e Antigen

HBsAg – Hepatitis B Surface Antigen

RCT – Randomized Controlled Trial

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