

Formulation and Evaluation of Liver Detoxification Herbal Syrup

Saurabh Sanjay Gaikwad and Prof. Manisha Virkar

Dr. Babasaheb Ambedkar Technological University, Lonere

Abstract: *This herbal liver detox syrup is made using triphala, a traditional ayurvedic blend of three fruits—amla, haritaki, and bibhitaki—known for their cleansing and antioxidant properties. Combined with other liver-supportive herbs like bhringraj, punarnava, kalmegh, and guduchi, this syrup helps support liver function, remove toxins, and improve digestion naturally.*

The formulation is made by blending herbal extracts into a sweet syrup base, making it easy to take and gentle on the stomach. It includes natural preservatives and optional flavoring for better taste and shelf life.

Ideal for people experiencing liver fatigue due to poor diet, alcohol use, or pollution, this syrup offers a safe and natural way to help the liver stay healthy and perform its detoxifying role in the body..

Keywords: triphala, liver detox syrup, herbal liver tonic, ayurvedic formulation, natural detoxification, hepatoprotective herbs, amla, haritaki, bibhitaki, bhringraj, kalmegh, punarnava, guduchi

I. INTRODUCTION

NEED OF INVESTIGATION:

The need for investigation into the formulation of a herbal liver detoxification syrup arises from both clinical demand and the limitations of existing therapeutic options.

1. Rising Prevalence of Liver Disorders

Liver diseases such as fatty liver, hepatitis, cirrhosis, and drug-induced liver injury are increasing globally due to poor diet, alcohol consumption, sedentary lifestyle, and exposure to toxins.

There is a growing need for safe, effective, and affordable hepatoprotective agents.

2. Limitations of Conventional Liver Medicines

Synthetic hepatoprotective drugs (e.g., silymarin, ursodeoxycholic acid) may cause side effects and are not always affordable. They often lack long-term safety data and do not offer holistic detoxification benefits.

3. Traditional Use of Herbs for Liver Health

Herbal medicines like *Phyllanthus niruri*, *Boerhavia diffusa*, and *Picrorhiza kurroa* have been traditionally used for liver ailments.

However, these remedies are often used individually or in crude form; there is a lack of standardized polyherbal formulations in a convenient dosage form like syrup.

4. Lack of Scientific Validation

Many herbal remedies used in traditional medicine lack scientific evidence regarding:

Mechanism of action

Standardized dosing

Pharmacological activity



In today's world, our liver often works overtime. Poor eating habits, pollution, stress, alcohol, and processed foods can put a heavy burden on this vital organ, making detox support more important than ever.

This herbal syrup is designed to naturally support the liver using triphala, a famous ayurvedic blend of three fruits—amla, haritaki, and bibhitaki—that are known to gently cleanse the body and boost digestion. These ingredients are combined with other powerful herbs like bhringraj, punarnava, kalmegh, and guduchi, which have traditionally been used to support liver health, reduce inflammation, and promote the body's natural detox process.

The result is a syrup that not only helps cleanse and protect the liver, but also improves energy, digestion, and overall well-being—without the harsh effects of synthetic detox products.

These herbs work synergistically to:

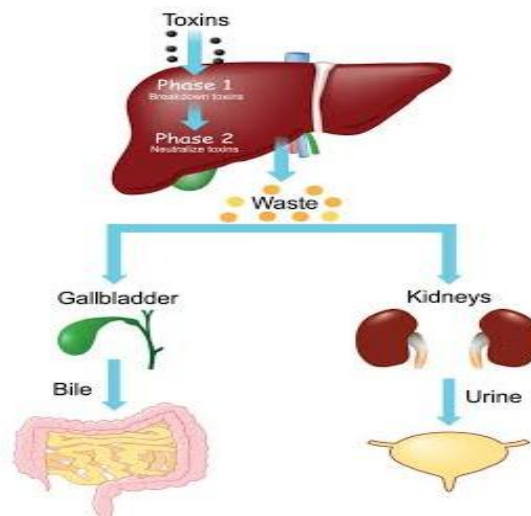
Cleanse and protect the liver

Promote detoxification through natural pathways

Improve digestion and nutrient absorption

boost energy and vitality

Liver Detoxification



Symptoms:

Digestive symptoms:

Bloating, gas, or indigestion

Constipation or irregular bowel movements

Loss of appetite or feeling full quickly

Nausea after fatty foods

Skin and appearance:

Dull or yellowish skin (early signs of jaundice)

Itchy skin or rashes

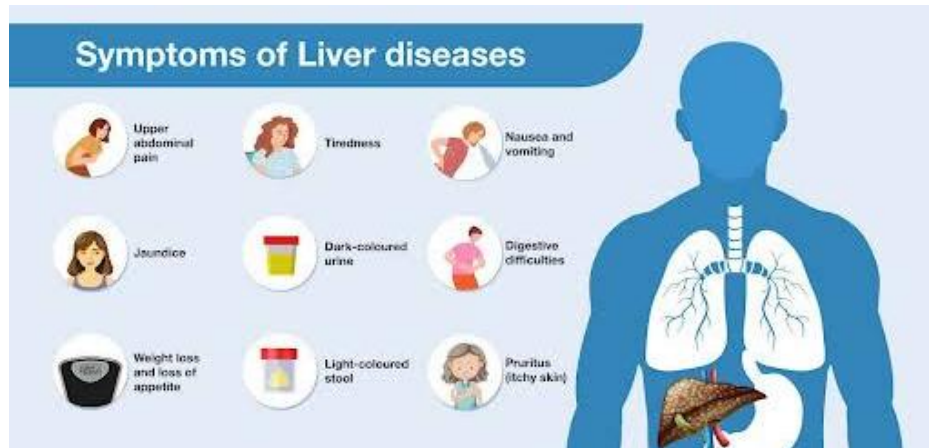
Acne or breakouts

Dark circles under the eyes

Excessive sweating or body odor



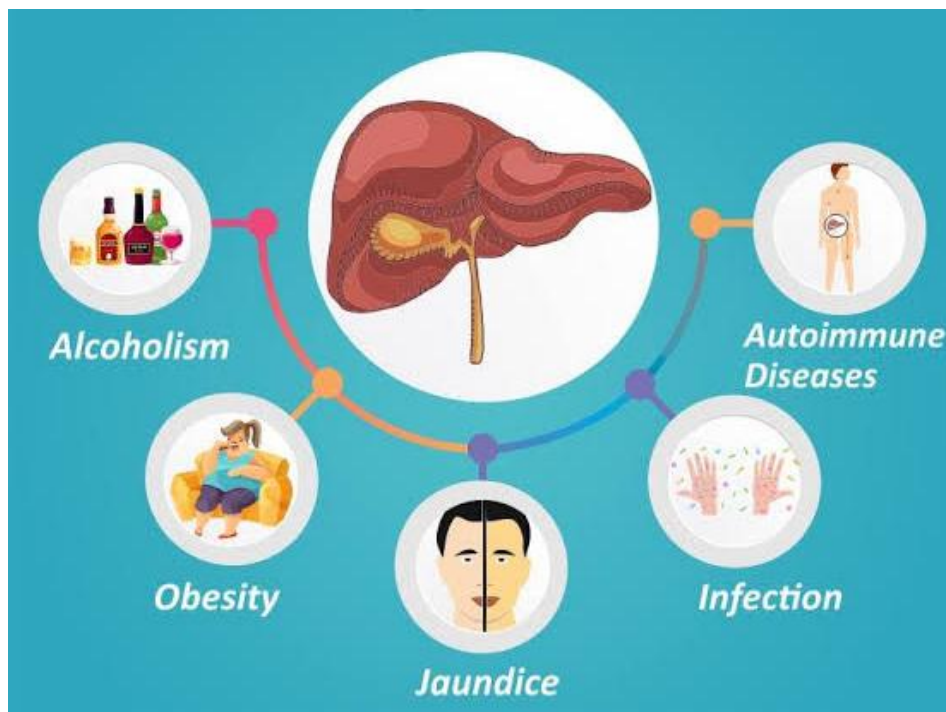
Energy and mood:
 Fatigue or sluggishness (especially in the morning)
 Brain fog or trouble concentrating
 Irritability or mood swings
 Difficulty sleeping or poor-quality sleep
 Weight and metabolism:
 Unexplained weight gain, especially around the abdomen
 Slow metabolism
 Sugar cravings
 Other signs:
 Bad breath or coated tongue (white or yellow)
 Sensitivity to smells or alcohol
 Frequent headaches
 Pale or clay-colored stools



Risk factor:

1. Unhealthy diet
 High intake of processed foods, refined sugar, fried foods, and trans fats
 Excessive consumption of red meat or preservative-laden foods
 Low intake of fiber, fresh fruits, and vegetables
2. Alcohol and substance use
 Regular or heavy alcohol consumption
 Long-term use of recreational drugs or smoking
 Excessive intake of caffeinated or sugary beverages
3. Medication overuse
 Prolonged use of painkillers (nsaids like ibuprofen), antibiotics, or statins
 Use of steroids or other drugs with known liver toxicity
4. Chronic stress and lifestyle factors
 Chronic emotional stress can impair liver function over time
 Lack of physical activity
 Sleep deprivation
5. Genetic and age-related factors
 Family history of liver disease
 aging (as the liver's regenerative capacity slows)





Management of disease:

1. Eat better for your liver

Eat more fruits, vegetables, and whole grains—they help clean out your system.

Avoid too much junk food, sugar, fried foods, and alcohol.

Drink lots of water to help flush out toxins.

Add bitter foods like greens and turmeric—they naturally support the liver.

2. Lower your stress

Too much stress can harm your liver over time.

Try yoga, meditation, or even just deep breathing to relax your body.

3. Get enough sleep

Your liver works hard to detox your body while you sleep.

Aim for 7–8 hours of good sleep every night to help it recover.

4. Use herbal support like triphala syrup

Your herbal syrup is a gentle, natural way to support liver health. It contains:

Triphala: a blend of 3 fruits that help clean out the digestive system and remove toxins.

Bhringraj: helps your liver heal and work better.

Kalmegh: fights inflammation and supports liver cleansing.

Punarnava: helps flush out excess water and waste.

Guduchi: boosts immunity and protects liver cells.

Take it daily as directed to gently support your liver.

5. Move your body

Regular physical activity—like walking, biking, or yoga—can reduce fat in the liver and improve your energy.





6. Get your liver checked

If you have ongoing symptoms, it's a good idea to visit a doctor.
Blood tests and scans can show how your liver is doing.

7. Avoid harmful chemicals

Stay away from harsh cleaning products, pesticides, and smoke as much as possible.
Use natural or eco-friendly alternatives when you can.

Herbal liver detoxification syrup is designed to support liver function using natural ingredients.

Herbal liver detoxification syrup is designed to support liver function using natural ingredients. Here's how it generally works:

How It Works

1. Supports Liver Function

The herbs in the syrup often help boost liver enzyme activity, which aids in breaking down toxins more efficiently.

2. Stimulates Bile Production

Ingredients like dandelion root and artichoke promote bile flow, which helps in the digestion and removal of fat-soluble toxins.

3. Reduces Oxidative Stress

Antioxidants (like those in milk thistle or turmeric) protect liver cells from damage caused by free radicals and inflammation.

4. Promotes Detoxification

Some herbs activate liver detox enzymes (especially Phase I and II detox pathways), helping the body process and eliminate harmful substances.

5. Regenerates Liver Cells

Certain compounds (such as silymarin from milk thistle) may help repair and regenerate damaged liver tissue.





II. DRUG PROFILE:

TRIPHALA

1. *Amla (indian gooseberry)*

amla, also known as indian gooseberry, is a small green fruit that has been used in indian traditional medicine (ayurveda) for thousands of years. It's known as a superfruit because it's packed with nutrients that help the body stay healthy, especially the liver, skin, and digestive system.



Fig.no *Amla (indian gooseberry)*

Rich in vitamin c amla has more vitamin c than oranges! This helps boost your immune system and fight off illnesses.

Powerful antioxidant

it protects your body from damage caused by toxins, pollution, and stress.

Supports liver health amla helps clean out harmful substances from the liver and supports the liver's natural repair process.

Aids digestion it helps with indigestion, bloating, and constipation by keeping your digestive system running smoothly.

Good for skin and hair it keeps your skin glowing and your hair strong by improving blood flow and reducing damage from free radicals.

Balances body functions in ayurveda, amla is said to balance all three doshas (vata, pitta, kapha), helping the body stay in harmony.

How amla works in your body:

Amla (indian gooseberry) may look small, but it does big things inside your body—especially for your liver, digestion, and immunity. Here's how it works, in plain language:

1. Fights cell damage (like a shield)

Amla is full of vitamin c and natural antioxidants. These protect your cells from damage caused by stress, pollution, junk food, and even aging. Think of it like putting a shield around your liver and other organs.

2. Cleans out toxins (like a natural cleaner)

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391

Your liver is your body's cleaning center. Amla helps the liver work better by activating enzymes that remove waste and harmful substances from the blood—kind of like turning on the body's natural garbage disposal.

3. Reduces swelling and irritation inside (anti-inflammatory)

When your liver or gut gets irritated (from alcohol, fatty food, etc.), amla helps calm it down. This reduces the risk of long-term damage.

4. Improves digestion (helps break down food)

Amla helps your stomach produce the right amount of acid and helps your liver make more bile—a natural juice that breaks down fats and aids digestion. This means less bloating, better bowel movements, and less work for your liver.

HARITAKI

Haritaki is a powerful medicinal fruit used in ayurvedic medicine for centuries. It's often called the "king of herbs" because it supports many body systems—especially digestion, detox, and overall rejuvenation.

It's one of the three key ingredients in triphala (along with amla and bibhitaki) and plays a big role in keeping the body clean and balanced.



Fig.no *HARITAKI*

Natural detoxifier

haritaki helps clean out waste from the intestines and supports the liver in removing toxins from the body.

Improves digestion

it stimulates the digestive system, relieves bloating, and helps with constipation—making it a natural gentle laxative.

Supports liver function

by helping remove toxins and improving digestion, haritaki lightens the liver's workload and boosts its efficiency.

Boosts energy and immunity

when your body is clean on the inside, you naturally feel more energetic and resistant to illness.

Balances the body

in ayurveda, haritaki is said to balance the vata dosha, which helps regulate the nervous system and digestion.

Anti-aging and healing properties

haritaki is believed to slow down aging, improve memory, and speed up healing—earning it a reputation as a rejuvenator.

How HARITAKI works in your body:

1. Haritaki is one of the key fruits in triphala, and in ayurveda, it's often called the "king of medicines." Why? Because it supports your digestion, helps your body eliminate waste, and boosts overall wellness.

Here's how it works inside your body:



1. Cleans out your digestive system

Haritaki acts like a natural cleanser for your gut. It helps move waste out of your intestines gently and regularly, making it great for people with constipation, bloating, or sluggish digestion.

2. Improves bowel movements (natural laxative)

It works by stimulating the muscles in your intestines so they move better and more rhythmically. This helps with easy, regular bowel movements—without causing dependency like chemical laxatives can.

3. Supports liver function

Haritaki helps lighten the liver's workload by improving digestion and helping the body get rid of toxins. A cleaner gut means fewer toxins for the liver to filter, so the liver stays healthier and functions better.

4. Reduces inflammation

It has natural anti-inflammatory properties, which means it helps calm down irritation inside your digestive system and other organs, including the liver.

5. Antioxidant & rejuvenator

Haritaki is rich in natural compounds that protect cells from damage caused by pollution, stress, and aging. It's considered a rejuvenator in ayurveda—something that helps the body heal and stay youthful.

BIBHITAKI

– balances metabolism and helps the liver process fats

– supports healthy bowel movements



Fig. no *BIBHITAKI*

How bibhitaki works in your body:

Bibhitaki is one of the three fruits in triphala, and it's especially known for helping the lungs, digestive system, and liver. It might not be as famous as amla, but it plays an important role in keeping your body clean, balanced, and functioning well.

1. Helps clean out toxins and waste

Bibhitaki supports your liver and intestines in getting rid of waste. It works like a natural detox helper, gently removing toxins and reducing buildup in the body—especially from unhealthy food, pollution, and stress.

2. Improves digestion and bowel movements

It helps your gut work more smoothly. If you struggle with constipation, bloating, or slow digestion, bibhitaki helps by making bowel movements more regular and comfortable.

3. Supports liver function

Bibhitaki helps protect liver cells from damage and supports the liver in breaking down fats and removing harmful substances. It also helps regulate bile, which the liver uses to digest fat.



4. Balances body fat and metabolism

It helps remove excess fat and fluids from the body and can help regulate cholesterol levels. This makes it helpful for people dealing with fatty liver, high cholesterol, or weight gain related to liver issues.

5. Has natural antibacterial and anti-inflammatory properties

Bibhitaki can fight off minor infections and reduce inflammation, especially in the lungs and digestive system. It's often used in ayurveda to help with cough, cold, and respiratory congestion.

6. Boosts your immunity (helps you stay strong)

Because it's high in vitamin c, amla also helps your immune system fight off infections, heal faster, and stay strong.

Sr. No	Ingredients	ROLE
1	Amla	Liver Protection It supports liver function and aids in detoxification. Heart Health Amla reduces cholesterol levels, improves blood circulation, and strengthens heart muscles.
2	Bibhitaki	Respiratory health Effective in managing cough, cold, and asthma.
3	Haritaki	Brain and nervous system Enhances memory, cognition, and calmness. Anti-aging and detox Promotes tissue regeneration and cellular repair

III. MATERIAL AND AND METHODS

Table no.1 Formulation of 100 ml syrup

Ingredients	Preformulation quantity[g][ml]	Post formulation quantity [g][ml]	Final formulation quantity [g][ml]
amla	7 [g]	7[g]	7[g]
Bibhitaki	7 [g]	7[g]	7[g]
Haritaki	7 [g]	7[g]	7[g]
sucrose	15 [g]	20[g]	30[g]
citric acid	2 [g]	2[g]	2[g]
sodium benzoate	1 [g]	1[g]	1[g]
glycerin	5 [ml]	5[ml]	5[ml]
Lemon juice	6 [ml]	5[ml]	5[ml]
Purified water	50 [ml]	46[ml]	36 [ml]

Table no.1

METHODS OF PREPARATION OF SYRUP

1. Collect and clean the herbs

First, we gather all the dried herbal ingredients like amla, haritaki, bibhitaki, and other herbs like kalmegh, bhringraj, guduchi, etc.

These herbs are carefully cleaned with fresh water to remove any dust or dirt.

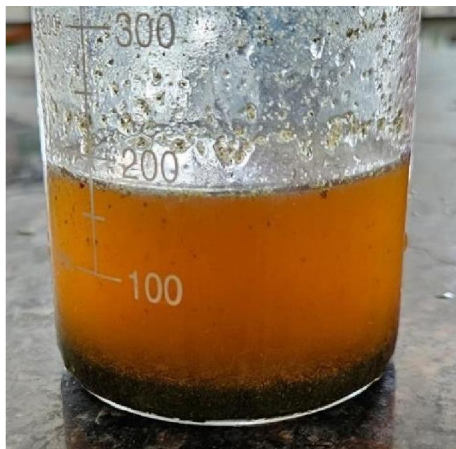
2. Make a herbal decoction (herbal tea)

The cleaned herbs are boiled in water for several hours.

This slow boiling helps pull out the active ingredients from the herbs into the water.

The liquid is then strained to remove the leftover solid parts of the herbs.





Leaves sample



Extraction of sample

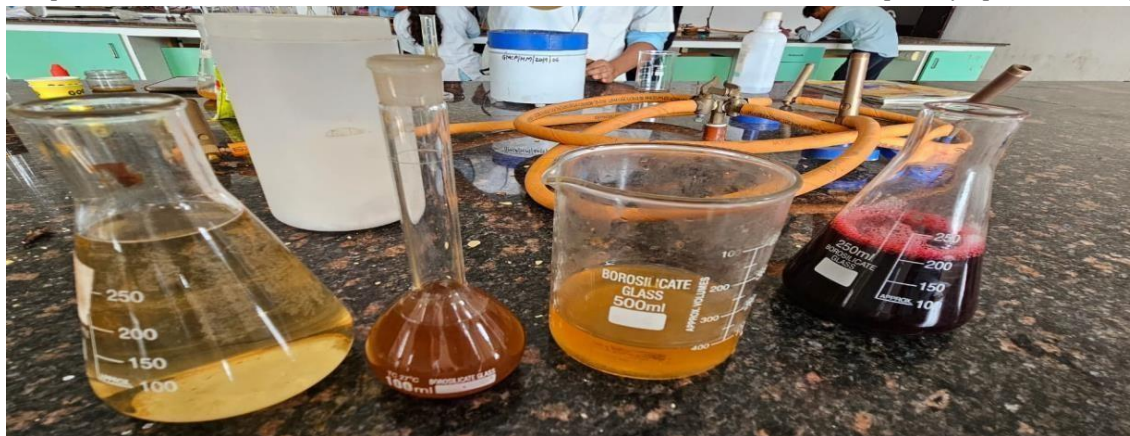
3. Concentrate the decoction

The strained herbal liquid is boiled again gently to make it thicker and stronger. This makes sure the syrup contains a higher amount of herbal power in every spoon.

4. Add sweeteners and preservatives

Once the herbal extract is ready and cools down a bit, natural sweeteners like jaggery, sugar, or honey may be added to improve taste.

Natural preservatives like sodium benzoate or citric acid are added in small amounts to keep the syrup fresh for longer.



Ingredient

5. Mix, filter, and adjust

The syrup is filtered again to make sure it's smooth. If needed, other ingredients like flavorings or color (from natural sources) are added. The final syrup is tested for consistency, taste, and safety.



6. Bottle and label the syrup

The finished syrup is poured into clean, sterile bottles.

Bottles are sealed tightly and labeled with details like ingredients, dosage, and expiry date.



SYRUP

EVALUATION AND CHARACTERIZATION

EVALUATION PARAMETERS:

1. Visual Inspection-passed(no particulate matter observed)
2. Color-yellowish amber color
3. Odour-Pleasant
4. Taste-Sweet
5. PH-Acidic
6. Clarity-Passed

THE PHYTOCHEMICAL ANALYSIS

Phytochemical analysis refers to the process of identifying the various bioactive compounds in a plant. Triphala, commonly known as Stonebreaker, contains numerous phytochemicals that contribute to its medicinal properties, particularly its hepatoprotective (liver-protecting) and antioxidant effects.

Terpenoids Detection (Salkowski's Test):

Approximately 0.5 g of the plant extract was placed in a test tube, followed by the addition of 2 mL of chloroform. Carefully, 3 mL of concentrated sulfuric acid (H_2SO_4) was added down the sides of the tube to form a distinct layer. The appearance of a reddish-brown coloration at the interface between the two layers was taken as a positive indication of the presence of terpenoids.





Test for Terpenoids

b) Alkaloids Detection (Dragendorff's Test):

A volume of 5 mL of the plant extract was transferred to a glass test tube. The chloroform-soluble layer of the extract was then subjected to extraction using 10 mL of acetic acid (CH_3COOH). Following this, a few drops of Dragendorff's reagent (a solution of potassium bismuth iodide) were added.

The formation of an orange to reddish-brown precipitate indicated the presence of alkaloids.



Test for Alkaloids

c) Flavonoids Detection:

Five milliliters of the plant extract were heated with 10 mL of ethyl acetate ($\text{C}_4\text{H}_8\text{O}_2$) over a steam bath for approximately 3 minutes. The mixture was then filtered, and 4 mL of the resulting filtrate was shaken with 1 mL of dilute ammonia solution. The development of a yellow coloration suggested the presence of flavonoid compounds.



Test For Flavonoids



d) Colour

1ml of final syrup was taken in a watch glasses and placed under light and colour is observed by a naked eye.

e) Odour

1 ml of final syrup was smelled individually and then the odour is detected.

f) Taste

A pinch of final syrup was placed on taste bud of tongue to identify the taste determination of viscosity.

g) Viscosity

Viscosity of herbal syrup is determined by using an ostwald Viscometer. Ostwald viscometer is thoroughly cleaned with chronic acid or acetone.

Viscometer should be placed in a vertical position in a suitable stand. Fill the water upto the mark in dried viscometer.

Now note the time required for water to flow from mark A to mark B. Now was the viscometer fill with the herbal syrup, and then note the time required for syrup to flow from mark A to mark B. Viscosity formula- Density of test liquid \times time required to flow test required /

Density of water \times time required to flow water = viscosity of water

h) Determination of PH

Take a 2 ml of syrup in the test tube and with the help of pH paper checked the pH of syrup. The pH of syrup is 6.4



Fig No. 15 PH Scale

IV. RESULT AND DISCUSSION

1. Organoleptic Properties

Sr.no	Parameter	Observation
1	Appearance	Dark brown liquid
2	Odour	Characteristic herbal aroma
3	Taste	Sweet and slightly astringent
4	Clarity	Opaque

2. Phytochemical constitute of the leaf extract of Triphala (Amla, Bibhitaki Haritaki)

Tests	Name of tests	In methanol extract
Terpenoids	Salkowski test	positive
Alkaloids	Wagners reagent	positive
Flavonoids	Ferric chloride test	positive



V. CONCLUSION

The hepatoprotective herbal syrup that has been developed with Triphala (Amla, Bibhitaki Haritaki) extract shows encouraging organoleptic qualities, safety, and efficacy. These results establish its efficacy and safety in human subjects and suggest its potential as a treatment intervention for liver problems. Additional clinical trials are necessary to confirm these findings. Additionally, the herbal syrup's therapeutic effectiveness may be increased by refining formulation parameters and investigating the synergistic effects with additional hepatoprotective herbs, providing new therapy alternatives for liver.

Herbal syrups offer advantages like better patient compliance, especially among pediatric and geriatric populations, due to their palatable and easily administered form. However, successful formulation requires careful attention to standardization of active constituents, stability, dosage accuracy, and organoleptic properties.

The formulation (F2) having antioxidant property hence it will be very effective for the management of liver detoxification.

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