



DEVELOPMENT OF HERBAL SYRUP FOR JAUNDICE TREATMENT

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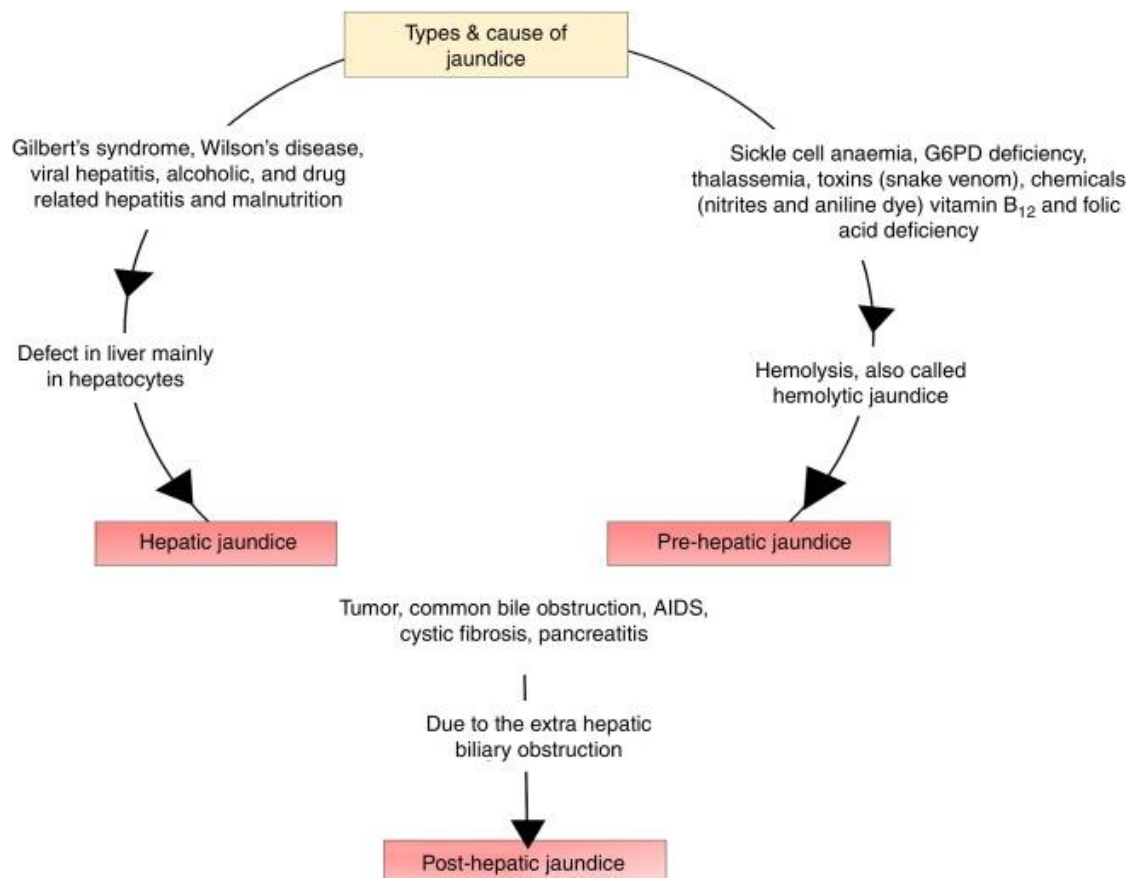
ABSTRACT

Jaundice is one of the most common diseases affecting the liver, where the skin, eyes, and urine undergo yellowish coloration, usually due to some malfunctioning of bilirubin metabolism. Though various conventional treatments exist for the treatment of jaundice, herbal remedies have been in practice since time unknown to prevent symptoms and restore liver function. This review explores the use of herbal syrups in the management of jaundice with special emphasis on Bhumiamalika, Bhringaraj, and the leaves of Papaya, all having hepatoprotective, antioxidant, and anti-inflammatory properties. The active principles in these herbs, flavonoids and phenolics, help to reduce the oxidative and inflammatory stress within the liver. Such processes of extraction like boiling and maceration are carried out to maximize the therapeutic effects. Even with such promise, safety and efficacy of herbal syrups would need clinical evaluation in order to ensure proper standardization and dosages in addition to quality control. The future for herbal jaundice treatments appears promising, although further research is undertaken to optimize their use and to minimize adverse effects.

Key Words: *Syrup, Medicinal, Herbal, Extraction, Jaundice*

1. INTRODUCTION:-

Jaundice is any sign or symptom of any liver disease. This mainly occurs in case there happens an increased circulation of bilirubin through blood due to bad metabolism or excretion inside the urine. Medicinal plants were found to be treated by our ancestors a very long time ago to relieve jaundice. Jaundice most commonly manifests as a yellow discoloration of the skin and sclera—the white of the eye [1, 3]. This review aims to provide an overview of some of the most powerful herbal plants and their role in the treatment of jaundice. The first-line treatment for this is a change in lifestyle and the use of herbal syrups, both to correct the injury from inside and to relieve discomfort such as itching, indigestion, etc. In addition to using herbal medicine to treat different illnesses, these medications are native and can be found locally in their natural state. It is important to accurately identify these plant-based drugs. The phytochemistry of these medications helps to determine the potential and actual active components found in specific plant species. The plant referenced in numerous classical texts continues to be commonly utilized for treating jaundice. There has been a significant rise in the popularity of herbal medicine over the past twenty years, making it increasingly sought after across different medical systems [1].



Jaundice is a condition in which the skin, whites of the eyes, and mucous membranes turn yellow because of high levels of bilirubin in the body. Bilirubin comes from red blood cells. When red blood cells wear out, hemoglobin, the iron-containing molecule, releases iron which is excessively converted into bilirubin. When that happens, bilirubin builds up in the blood and moves to the tissues so that the eyes and skin become noticeably pale [2]. Jaundice is not an illness on its own but is a symptom of an underlying health issue. It is characterized by a yellowish tint in the skin, eyes, and mucous membranes. Jaundice is typically caused by elevated levels of bilirubin, which can indicate liver damage or difficulty with the body's natural processes. Jaundice is a serious condition that can be difficult to manage. There are several traditional herbal remedies for treating jaundice that are widely used in various healthcare systems today [4]. Hepatic jaundice caused due to abnormal metabolism and excretion of bilirubin in the liver and pre-hepatic jaundice caused due to the hemolysis of red blood cells [5].

1.1. Symptoms of jaundice:-

- A potential cause of jaundice is an obstruction in the bile ducts, often resulting from excess bilirubin in red blood cells. This condition occurs when there is an abnormal buildup of bilirubin, a yellowish pigment formed during the breakdown of red blood cells. The blockage of the bile ducts prevents bilirubin from being properly excreted, leading to its accumulation in the bloodstream. As a result, the concentration of bilirubin pigments in the blood increases, causing the skin, urine, and eyes to develop a yellowish color [6].
- An increase in bilirubin pigments in the blood can lead to a yellowish color in the skin, urine, and eyes. This discoloration, known as jaundice, is one of the most noticeable symptoms of this condition. The yellow tint is particularly prominent in the sclera of the eyes, giving them a yellowish appearance. Additionally, the skin may take on a yellow hue, particularly on the face and abdomen. Furthermore, the urine may appear dark yellow or brown, while the stool may appear pale or clay-colored due to the impaired flow of bile.
- Common symptoms in patients include yellowing of the eyes, skin, and urine, as well as feelings of weakness and fever. Those experiencing jaundice often exhibit a range of symptoms, with the most common being the yellowing of various body parts. When bilirubin levels rise, it affects the pigment of the eyes, skin, and urine, leading to their yellowish discoloration. In addition to the visible signs, individuals may experience weakness and fatigue as the liver struggles to process bilirubin effectively. Some patients may also develop a low-grade fever, which is often a response to the underlying infection or inflammation causing the obstruction [7, 8].
- Other symptoms may include vomiting, headaches, and loss of appetite. Alongside the predominant signs of jaundice, patients may also present with additional symptoms. These can include episodes of vomiting, causing the individual to feel nauseous and experience a loss of appetite. Headaches, although less common, may occur due to the impaired function of the liver and the resulting disruption to normal bodily processes. It is essential for individuals experiencing

these symptoms to seek medical attention promptly, as the underlying cause of jaundice may require further investigation and treatment [9].

1.2. Importance of Herbal Remedies:-

Medicinal plants have long been acknowledged for their potential in alleviating bodily discomfort. Herbal products are the sole resources for combating illnesses in all living organisms, and may also be termed as traditional systems and natural products. Jaundice, a prevalent liver disease in adults, particularly the elderly, and children, demands precise diagnosis as it is a significant condition [10, 11]. The elderly are especially prone to this disease. Herbal medicines contain bioactive compounds or mixtures of compounds that target specific disease processes. The use of conventional drugs may lead to toxicity and severe side effects, underscoring the need for the health system to provide safe and effective treatments for patients. In the management of jaundice, herbal mixtures should be administered alongside available synthetic drugs at appropriate dosages for the ailment. An effective medication for complete elimination of bilirubin is currently unavailable. This scarcity has created opportunities for the development of new and safer medications derived from herbal sources, ensuring a prompt and safe recovery. As a result, there is a growing interest in assessing the effectiveness of herbal blends in improving their bioavailability through combination with various pharmaceutical formulations. [12] Traditional medicine has long utilized a significant number of medicinal plants to address gastrointestinal ailments like jaundice worldwide. Given jaundice's association with the liver, treatments typically focus on enhancing liver function, making it vital to identify innovative therapeutic medications. The liver plays a central role in managing and regulating most bodily functions. In India, plants are commonly used in traditional medicine for jaundice treatment due to their assortment of disease-related compounds [11].

2. The primary raw material utilized in the formulation of the Herbal syrup to treat Jaundice:-

1. Bhumiamalika (*Phyllanthus niruri*)-



Bhumiamalika is also known as Tamalaki, jata, vira, or uccata. This herb is derived from the dried portions of *Phyllanthus Niruri*, a plant belonging to the *Phyllanthaceae* family. The plant has oblong, sessile, and alternate leaves, small white-greenish solitary flowers, and round fruits that resemble a gooseberry. Its bark is light green and smooth, and the taste of the plant is both bitter and astringent. The whole plant is used as the part of interest [13].

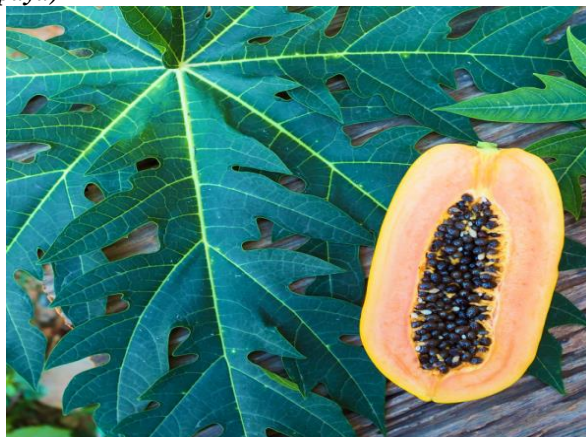
2. Bhringraj (*Eclipta prostrata*)-



Bhringraj, also known as false daisy, is a plant of the *Asteraceae* family, with the biological source being *Eclipta prostrata*. The roots of Bhringraj are cylindrical and grayish, while the stems are solid, circular, and purplish in color with white fine

hairs. The leaves are lance-shaped, sessile, and arranged in opposite pairs, measuring from 2 to 12.5 centimeters in length and 5 to 35 millimeters in width. The fruit is brown, cuneate, and one-seeded with a narrow wing [14].

3. Papaya Leaves (*Carica papaya*)-



Papaya Leaves - Also known as *Carica papaya* or the Milon tree papaya. It is derived from the Papain cystatin, belonging to the Caricaceae family. The plant is characterized by a single, straight, semi-woody trunk with hollow space, supported by phloem fibers. Leaves are large and deeply lobed, while the fruit is a berry with thin skin and thick, fleshy pulp. Seeds are small and black. The leaves are the part used [15].

4. Giloy (*Tinospora Cordifolia*)-



Other Names for GILOY - Guduchi, Amrita, Gulvel Obtained from *Tinospora Cordifolia*, a climbing shrub in the Menispermaceae family, GILOY is made up of long, thread-like roots that are aerial and arise from branches, as well as fleshy roots. The bark is thin, and can be grayish or creamy white. When peeled, the bark exposes a fleshy stem, which is also creamy white or grey. The leaves are Cordate, or heart-shaped, and membranous. They are juicy, and the fruits are pea-shaped, fleshy, and become shiny red when boiled. These fruits occur in winter, and the seeds are curved and pea-sized. Stems are the only parts of the plant used [16].

5. Daruharidra (*Berberis aristata*)-



Indian barberry, also known as Tree turmeric, is derived from the *Berberis aristata* plant, which is a member of the Berberidaceae family. The bark of this plant is yellow to brown on the outside and deep yellow on the inside. It is characterized by three-branched spines, measuring 1.5 cm long, and broad, ovate, toothed, deep green leaves. The flowers

of this plant are yellow, hermaphroditic, and actinomorphic, while its fruits are ovoid berries with an aconite violet outer color and purplish interior flesh. Each fruit contains 2 to 5 seeds, ranging in color from yellow to pink [17].

6. Gokhuru (*Tribulus terrestris*)-



Gokhuru, also known as Bull's head or Goathead, is derived from the dried fully ripened fruits of the plant *Tribulus terrestris*, which is a part of the zygophyllaceae family. The plant features fibrous, light brown roots, round-shaped pinnately compound leaves, silky hermaphrodite solitary flowers with five broad yellow petals, and Spinous, glabrous, five-cornered, and hairy fruits covered by greenish yellow sharp thorns. The seeds are oily and enclosed in hard stony cells [18].

7. Katuki (*Picrorhiza kurroa*)-



Katuki is also known as Katuruhini, Pitarohini, Kastumbhara, and Matsya Shakala. It is derived from *Picrorhiza kurroa*, a plant from the Scrophulariaceae family. The plant has leaves that are 5–15 cm long, coarsely toothed, and narrowed to a winged stalk, and its rhizomes are 15–25 cm long, woody, and grayish-brown in color. Katuki has small, pale or purplish blue flowers, 5-lobed, and borne in cylindric spikes. Its fruits are 1.3 cm long, two-celled, spherical, and tapered at the top. The plant's stems are small, weak, leafy, and slightly hairy. It has a very bitter and long-standing taste, and its odor is faint or disagreeable [19].

8. Haritaki (*Terminalia chebula*)-



Also known as Abhaya, amruta, pathya, kayastha, Haritaki is derived from the tree *Terminalia chebula* Retz. Belonging to the Combretaceae family. The leaves of the tree are oval and arranged alternately, while the flowers are dull white to yellow with a strong, unpleasant odor. The fruits are ovoid and yellow to orangish-brown in color with five distinct longitudinal ridges along its surface. The bark of the tree is dark brown, and Haritaki has a sour and bitter flavor [20].

9. Aprajita (*Clitoria ternatea*)-



Aprajita is also known as Aasfota, girikarni, vishnukranta, sweta, and mahasweta. It is a plant species in the Fabaceae family, with ovate or lanceolate bright green leaves that are 2-4 inches in size. The flowers are blue or purple with white or yellow markings, and funnel-shaped with 5 petals. The stem can be green or woody, with a smooth or hairy texture, and the plant has a taproot. Aprajita has a pungent, bitter, and astringent taste [21].

10. Babool (*Vachellia nilotica*)-



The Babool, also known as Egyptian acacia, Black piquant or Indian gum, is a flowering tree in the Fabaceae family. It has a short, thick, and cylindrical trunk with bark that can range in color from grey to reddish-brown or black. The bark is rough and furrowed, often with thin, straight, light grey spines in 3 to 12 pairs. The leaves are Bipinnate, with 3-6 pairs of pinnulae and 10-30 pairs of leaflets each. Its flowers are bright golden-yellow and set up in globulous heads 1.2-1.5 cm in diameter. The pods are white-grey, thick, softly tomentose, and strongly constricted [21].

11. Vibhitaki (*Terminalia bellirica*)-



Other names for Vibhitaki include baheda, bahera, behada, beleric, or bastard myrobalan. It is derived from the dried ripe fruits of *Terminalia bellirica*, which is a member of the Combretaceae family. The plant has a straight trunk with buttresses, thick brownish-gray bark with shallow longitudinal fissures, grey-green leaves that are smooth and net-like when old, greenish-yellow spiky flowers with a strong smell, and grayish oval fruits with five ridges [19].

12. Kali musli (*Curculigo orchioides*)-



A Detailed Look at Synonyms, Biological Source, and Plant Description Synonyms for Kali musli include "golden eye-grass," "xian Mao," and "weevil-wort." The biological source of this plant is in the dried tuberous roots and rhizomes obtained from *Curculigo orchioides*, which belongs to the Amaryllidaceae family. When describing the plant, the roots are tuberous and deep black in color, while the rhizomes are also deep black with prominent, loosely spaced transverse wrinkles. The leaves are linear or lanceolate and resemble those of a palm, with ridges that are 1-2 inches wide. The flowers bloom from June to August, and the stalk of the floral is yellow. The fruits are 0.5 inches long, and the seeds inside are black, shiny, and wavy [19].

13. Kalmegh (*Andrographis paniculata*)-



Kalmegh, also known as Nilavembu and Swertia Chirata, is derived from the dried leaves of the *Andrographis paniculata* plant, a member of the Acanthaceae family. The plant's stems are flat, wide, and fibrous, while its leaves are opposite, sessile or sub sessile, and typically 3-8 cm long. Kalmegh flowers are pedicelled, biliped, and may be white-purple or spotted purple, appearing solitary. The plant also features a tap root [22].

14. Kakamachi (*Solanum nigrum*)-



Synonyms -Vayasi, dwankshmachhi, kakahvya, kamatta Biological source - *Solanum nigrum* Linn is herb of Solanaceae family Plant description Stems-rough in texture and are either sparsely hairy or hairless. Leaves: The leaves are ovate to heart-shaped, hairy or hairless, and have wavy or large-toothed edges. Flowers: white, with greenish to whitish petals, prominent bright yellow anthers Fruit: small, smooth, spiral berry, blue when ripe [20].

15. Amla (*Phyllanthus Emblica*)-



Amla has multiple names including emblic, emblic myrobalan, myrobalan, and Indian gooseberry. It is derived from the *Phyllanthus emblica* L. tree, which is a short-lived tree in the Euphorbiaceae family. The bark of the Amla tree is characterized by its mottled, flaky, and ashy appearance. The leaves are light green and simple, while the flowers are greenish-yellow. The fruit is nearly spherical and light greenish-yellow with six vertical stripes or furrows. Amla has a very sour taste and can sometimes be bitter [23].

16. Peepal (*Ficus religiosa*)-



Peepal, also known as *Ficus religiosa* or Bo tree is a plant belonging to the Moraceae family. It has heart-shaped leaves with a wavy edge and elongated tip, small green figs that turn purple when ripe, and reddish-brown or yellowish-brown bark. Its flowers are unisexual and red in color [24].

17. Arjuna (*Terminalia Arjuna*)-



Other names for Arjuna are *Terminalia cuneata* Roth and *Chuncoa glabra* Buch. It comes from the plant *Terminalia Arjuna*, which is part of the Combretaceae family. The color of the outer side is grayish brown, while the inner side is reddish brown. It has no discernible odor and has a strong astringent taste. The pieces come in various sizes and are flat in shape [25].

18. Nimba (*Azadirachta indica*)-



Other Names for Neem - Arita, Picumarda, Sarvatobhadra Biological Source - Neem comes from the fresh or dry leaves and seed oil of *Azadirachta indica*, a member of the Meliaceae family. Description of the Plant Leaves: Dark green, with reddish or purplish young leaves. Flowers: Small, white, and aromatic, with both male and female parts. Fruit: Smooth, yellow-green drupe with sweet pulp. Bark: Thick and furrowed. Taste- Bitter [26].

2.1. Selection of Herbs:-

The process of selecting the herbs is a crucial step in making syrup for jaundice. These herbs are carefully chosen based on their proven benefits, such as reducing lipid levels and protecting the liver. It's important to combine the herbs in such a way that they work together to effectively treat jaundice, as no single herb can fully address the condition. The liver plays a vital role in removing toxins from the body, so it's essential to understand the chemical composition of the herbs and how they benefit the liver [27, 28].

Here are the specific benefits of the herbs that are essential ingredients in the syrup: bhumi amalaki is a traditional liver tonic, Bhringraj protects the liver, Amla acts as an antioxidant and boosts the immune system, papaya leaves are highly protective for the liver, and Giloy reduces inflammation. Other herbs like Emblica ribes, Arjuna, Nityanandam, Phyllanthus niruri, Chebulic myrobalan, Tamarind, Caper, Indian laburnum, and Terminalia bellirica also have important liver-protective properties. It's important to use equal amounts of each herb to create comprehensive syrup for treating jaundice [28, 29].

3. Different techniques used for the formulation of herbal syrup:-

The preparation of syrup is tedious compared to other drugs. The quality of the output syrup depends on the quality and quantity of the synergistic herbs used in the formulation. Herb preparation, such as coarse and fine powder, has to be standardized [30]. The excipients and preservatives have a tremendous effect on the stability and shelf life of the final product. To obtain the maximum therapeutic effect for a particular disease, in pharmacy, the herbs are made into formulations using various other drugs that are compatible and have the same combination of tastes. The taste of the syrup, which excites thirst, is highly beneficial for consumption, and in the case of children, this is true. Herbal concoctions are superior to single constituents. Therefore, the first medicines mentioned in Ayurveda are formulations of the combination of drugs made by an increased number of drugs according to the condition of individuals [31, 32]. Individual drugs are mixed with others after homogenization. Syrups are served in reduced form since it contains the extract of the drugs [33]. Herbal syrups are easily accepted by infants and toddlers. The syrups are prepared using different methods and strategies, but the preparation of herbal syrup for the treatment of jaundice has been explained here. The syrup was filled and stored in a glass storage container [34]. The herbal formulation is prepared using the roots, stems, or leaves of various plants. Different parts of the herbal plant are used in the preparation as per disease requirements. The aqueous extract of the combination of plants is incorporated into syrup bases and stored. The syrup of herbal plants is prepared to treat jaundice [34, 35].

3.1. Extraction method used for extracting of herbs:-

The extraction methods for making herbal syrup include boiling the herbs in water and then straining the liquid to extract the medicinal properties. Maceration is more commonly used to extract the active compound of leaves or powder-like plants or parts in water. Jaundice is a disease related to the liver, which is primarily caused by viral and bacterial infections. These infections lead to inflammation in the liver. The objective of the present research was to prepare a comprehensive sketch of herbal syrup for the treatment of jaundice. In this regard, various extraction methods for making herbal syrup are extensively discussed and analyzed [36].

The herbal syrup formulation includes a combination of different beneficial herbs such as Bhumi amalika, Bhringraj, Peepal Leaves, Daruharidra, Haritaki, Vibhitaki, Papaya leaves, Aprajita, Terminally Arjuna, Babool, Nimba, Kalmegh, Kakamachi, and Katuki. These herbs, along with extractors like Jaggery and honey, play a crucial role in formulating the herbal syrup. Jaggery, honey, and bumble beeswax are specifically used as extraction media. After an in-depth discussion, it can be concluded that in the process of herbal maceration and extraction, honey exhibits the highest efficiency in

extracting the beneficial properties of the herbs. Additionally, to ensure the preservation and synergistic effects, bumble beeswax is used in a concentration of 10% of the herbal extract. This concentration has been determined as the most effective for maintaining the quality and therapeutic potential of the herbal syrup [37].

Overall, the findings from this research shed light on the importance of proper extraction methods and the inclusion of specific ingredients for the development of effective herbal syrup for the treatment of jaundice. The selected herbs, along with the optimized use of Jaggery, honey, and bumble beeswax, present a promising solution in the herbal medicine field. Their combined effects can potentially provide relief and aid in the recovery process for individuals suffering from jaundice [38].

4. Pharmacological Actions of Herbal Ingredients:-

After the administration of herbal ingredients, the hepatoprotective effects are attributed to the presence of certain bioactive constituents, such as phenolic compounds or flavonoids. These bioactive constituents play a vital role in safeguarding the liver from damage and promoting its overall health. Studies have shown that these herbal ingredients possess potent antioxidant activity, which aids in protecting the liver against oxidative stress and lipid peroxidation. Moreover, their hepatoprotective effects extend to reducing liver damage, including the alleviation of jaundice symptoms, resulting in a subsequent decrease in serum bilirubin levels [39].

In addition to their antioxidant properties, the herbal syrup's beneficial effects in the treatment of jaundice are associated with its remarkable antioxidant activity, which has been substantiated by its ability to mitigate DNA damage. Furthermore, these herbal ingredients exhibit immunomodulatory and anti-inflammatory effects, thereby mitigating oxidative stress and shielding hepatocytes from potential harm. The cumulative effects of these mechanisms contribute to the overall hepatoprotective efficacy of the syrup.

It is crucial to highlight that the herbal ingredients utilized in the syrup formulation hold immense potential as hepatoprotective agents. Nevertheless, it is worth mentioning that limited studies have been conducted on the safety profile of certain included herbs. Therefore, it becomes imperative to determine appropriate dosages to circumvent any potential adverse effects while ensuring the delivery of therapeutic benefits [40].

It is noteworthy that the wide range of hepatoprotective mechanisms exhibited by herbal syrup can be attributed to the presence of various active principles. These active principles act in synergy to target different pathogenic factors, conferring an advantageous edge in utilizing herb complexes for liver health. Consequently, the present review aims to identify and elucidate the pharmacological benefits of syrups formulated specifically for the treatment of jaundice. Notably, these syrups incorporate the use of sugarcane and other herbal ingredients in their composition, harnessing their combined therapeutic potential in combating jaundice and promoting liver function [41].

Typically, a variety of active principles contribute to the wide range of hepatoprotective mechanisms of herbal syrup. Thus, there is an advantage in using herb complexes that target different pathogenic factors. Therefore, the present review was performed to identify the pharmacological benefits of syrups formulated for the treatment of jaundice, which includes sugarcane and herbal ingredients in their composition [42].

5. Safety and Side Effects of Herbal Syrups:-

Herbal syrups prepared from various herbs have been used for the treatment of various diseases long before the development of the modern system of medicine, particularly for the treatment of parasitic diseases, as well as the diseases of the liver, kidneys, and other vital organs. In developing countries such as Bangladesh, herbal syrups are used as an alternative system of medicine. However, considering the lack of standardization of the medicinal herbs, inadequacy of safety, and effectiveness studies, as well as the limited clinical information, it is unclear whether they are beneficial or harmful to use. Some medicinal plants in higher doses for a prolonged period or irregular use can result in toxic effects in the human body [43, 44]. Apart from this, herbal medicines are not without side effects or interactions. Sometimes, they may be fatal when taken in combination with other medicines or chemical drugs. The biological safety of herbal drugs or folk medicines is a matter of concern and investigation. In this context, the effectiveness and safety evaluation of herbal medicines is crucial for worldwide consumer safety, particularly in the context of global trade. The quality, security, and responsible use of natural medicine are shared concerns of regulators, manufacturers, healthcare professionals, and consumers that need to be addressed. Given the high volume of research conducted on herbal medicines, information on the safe use of herbal medicines in the treatment of liver diseases, particularly on drug-induced liver injury, as well as the side effects associated with suspect herbal medicines from worldwide regulatory authorities, is essential. In traditional medicine, many medicinal plants are used as hepatoprotective agents [44]. However, hepatotoxic herbal ingredients are also described. Single or multiple natural products in specific preparations can be hepatotoxic. The toxic effect usually depends on the quality of the product used, the dose, and the duration of the treatment, as well as the availability of other safer treatments for the same indication. The current trend in the use of herbal medications as an integral part of healthy living is fueling research relating to their possible toxicity and interaction with modern drugs. However, commercially

available proprietary herbal medicines may vary in quality when analyzed by advanced analytical instruments. Irrespective of the origin of the herbal product, it needs to be established as an evidence-based modern herbal drug molecule through different standardization protocols for quality, safety, and efficacy reasons [45, 46].

The scientific support for the safety, efficacy, and preparation variability surrounding these natural products is currently lacking. The epidemiological evidence suggests that they are in widespread use by certain populations. Herbal syrups have been used as home remedies for decades; these syrups help to relieve common cold, cough, and fever symptoms [47]. However, the present review of the study suggests that further clinical studies should be conducted to understand the safety, efficacy, and mechanisms of the individual ingredients of these endemic herbal syrups. In conclusion, we can be sure that herbs are better than chemical drugs because of their cost. These endemic substances made from herbs are the result of self-medication and an important group of drugs that convey traditional methods. The message behind the value and importance of herbal medication is significant [48]. Moreover, regulation and certification of the production of these herbal products is essential. The human cost of toxicity, even for substances that are safe, is a concern. It is our responsibility to ensure effective, potent, and standardized products, and that harmful substances do not enter the market. The present research studies conducted on the preparation, efficacy, and safety of these substances are dubious and enlightening and will provide further guidance on the preparation of quality safety evaluations. More extensive studies will be needed on the safety and potential toxicity of these plant-derived remedies, but at present, no good evidence supports the use of some of these [49].

6. Future Prospects of Herbal Syrups in Jaundice Treatment:-

While discussing the future aspects of herbal syrups for the treatment of jaundice, it is very important to look back at the approaches adopted by ancient human utilizations of various herbs. Indian traditional medical practitioners have documented the use of different plant extracts for the treatment of jaundice and other liver-related diseases [50]. Syrups from *Cichorium intybus* and other related species of *Cichorium* are used in many regions of the world. These are prepared using dried roots of *Cichorium intybus* and are safe and effective in the treatment of jaundice. Similarly, the use of other plant extracts, including essential oils, has promising properties for the treatment of jaundice. The extract of *Punarnava* has been found to be effective in decreasing liver enzyme levels while exerting potent antioxidant effects and stimulating the moderate degradation of the liver. Extracts of certain plants, such as *Trichopus zeylanicus* and *Permea elaeagnoides*, are also effective in treating symptoms associated with jaundice caused by pathogenetic ill effects on heat. These plant extracts are known to be effective in the treatment of infectious diseases. The root extract of *Trichopus zeylanicus* has been used traditionally for boosting energy, and its different products are in use for the stimulation of metabolism. The treatment with *Permea elaeagnoides* is recommended for jaundice syndrome because it has the ability to protect against mild to moderate radiation. Therefore, a person suffering from homeostasis to radiation should maintain the treatment with *Permea elaeagnoides* for a period of 2 weeks, which is a slow dose to re-trigger the homeostatic processes [51, 52].

Conclusion:-

Herbal drugs have been found very promising in the management of jaundice as they assist the liver and prevent the toxic accretion of bilirubin. Formulation of the herbal syrups is possible which makes a complex of various plant constituents into a natural alternative instead of conventional treatment. This is considered to offer a number of hepatoprotective effects because of the synergistic action of bioactive flavonoids and other phenolic compounds resulting in reduction of oxidative stress, inflammation, and direct damage to the liver. Herbs such as *Bhumiamalika*, *Bhringraj*, and *Papaya leaves* among others, have established efficacy based on traditional use and recent scientific research. While such herbal remedies have enormous healing potential, safety and efficacy have to be proven through vigorous clinical trails. Standardization of herbal preparation in terms of quality and consistency is prerequisite so as to ensure their safety; misuse or formulation of such herbal products with inconsistency can also bring about the worst of effects. An interaction between herbal medicines and conventional drugs remains of concern; therefore, further studies should be conducted to research toxicities and drug interactions. All in all, the future appears promising for herbal syrups in the treatment of jaundice, and further research may bring an increase in clinical use and greater accessibility and safety for the management of liver health. Further studies and regulation are necessary to make sure that such natural remedies are provided with responsible and effective usage.

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