IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Formulation And Evaluation Of Herbal Churna And Juice As Liver Tonic For The Treatment Of Jaundice

Ms. Faby Raju, Mr. Yash Gurav, Mr. Rahul Puthran, Ms. Priti Kanojiya, Ms. Aishwarya Patil, Mr. Adarsh Mokal Assistant Professor Student Student Student Student Student Student

CSMU School of Pharmacy, Panvel, India

Abstract: The Project, FORMULATION AND EVALUATION OF HERBAL CHURNA AND JUICE AS A LIVER TONIC FOR THE TREATMENT OF JAUNDICE, Jaundice is a clinical condition characterized by yellowing of the skin, eye, and mucous membranes due to elevated bilirubin levels, remains a significant health concern world-wide. Conventional medicine treatment causes liver dysfunction and infection. However herbal medicine gained attention for their potential efficacy, affordability and minimal side effect. This review explores the role of the herbal plants in managing jaundice, emphasizing their hepatoprotective and anti-oxidant properties. It is characterized by yellow skin, mucosa, and sclera resulting from the increased production of bilirubin, usually over 2.5 and 3.0 mg/dL. Jaundice may occur either from increased production or reduced excretion of bilirubin due to several diseases and conditions that affect the liver, such as different types of hepatitis, liver cirrhosis, Gilbert syndrome, cholestasis, alcohol or drugs abuse, autoimmune disorders, hemolytic anemia, liver cancer, etc. For treatment of jaundice various herbs are used such as bhumi Amla (Phyllanthus niruri), tulsi (Ocimum tenuiflorum) and Kutki (Picrorhiza kurroa). The plants were arranged with correct nomenclature along with their common name, family, botanical name, the part of plant with their mechanism of action which have been reported in different kinds of literature. The use of decoction is the most preferred method of herbal preparation. The study indicates that the local inhabitants rely on medicinal plants for treatment. This paper proposed further clinical experimentation in order to scientifically evaluate these widely used herbal remedies for possible bioactive effects.

Index Terms **- Component, formatting, style, styling, insert.**

I. INTRODUCTION

Jaundice is the clinical condition caused by the yellowing of the skin, eyes, and mucous membrane due to the elevated bilirubin levels, remains a significant health concern worldwide. Many people with jaundice also have a dark urine and light colored stool. The most common types of the jaundice are Hepatitis, alcohol related liver disease, a blockage of bile duct by gallstone or tumor, blood disorders. Prolonged or untreated jaundice due to liver dysfunction can result in chronic liver damage, liver failure or need to liver transplant. Conventional medicine treatment causes liver dysfunction and infection. However herbal medicine gained attention for their potential efficacy, affordability and minimal side effect.

Jaundice is most often temporary and not harmful, but it can be serious or even life-threatening if not properly treated. Prompt treatment can prevent most complications. Untreated jaundice can lead to serious health issues such as chronic liver damage, neurological deficits, or systemic infections. The treatment aims to mitigate these risks. Deposition of bilirubin happens only when there is an excess of bilirubin and this indicates increased in production or impaired excretion Bilirubin has two components which is unconjugated (indirect)

and conjugated (direct) hyperbilirubinemia Unconjugated hyperbilirubinemia results from increase red blood cells turnover, increases bilirubin loading or distribution in hepatocellular update and bilirubin conjugation Conjuncted hyperbilirubinemia id defined as total bilirubin ratio of more than 15-20%, or bilirubin level above 1.0mg/dL.

Types of jaundice:

1. Pre Hepatic Jaundice: Pre-hepatic jaundice, or haemolytic jaundice, is a condition where more breakdowns of the red blood cells are occurring than can be processed by the liver, so unconjugated bilirubin is being overproduced. This is usually an inherited condition, such as sickle cell anaemia, thalassemia, or hereditary spherocytosis, but sometimes it is acquired through causes like malaria, autoimmune haemolytic anaemia, or reactions to certain medications. Jaundice is characterized by yellowing of the skin and eyes, fatigue, and dark-coloured urine, but the colour of the stool is normal. Unlike other causes of jaundice, liver function is preserved, and there are no significant signs of liver damage. Diagnosis includes blood tests to check the bilirubin level, haemolysis (for example, CBC, peripheral smear, reticulocyte count), and identification of the cause of the disease, such as Coombs test for autoimmune haemolysis. The treatment is usually aimed at treating the underlying cause, such as corticosteroids for autoimmune conditions or antimalarial drugs for infections. In severe cases, blood transfusions or supportive care may be needed. Once the cause is treated, the liver resumes normal processing of bilirubin, and jaundice subsides.

2. Hepatic Jaundice: Damage to the liver tissues or liver functional failure causes damage leading to inability in the liver processing and excreting bilirubin. Unconjugated and conjugated bilirubin's are both formed in the body. Hepatitis, liver cirrhosis, alcoholic liver diseases, drug induced liver injury and genetic disorders that include Gilbert's syndrome are known causes. Additionally, infections within the liver or the toxins that attack the liver cell can cause liver dysfunction. The condition is diagnosed by yellow discoloration of the skin and eyes, dark coloration of the urine, pale coloration of the stools, and generalized pruritus. Severe impairment of liver function is associated with additional symptoms such as fatigue, abdominal pain, and swelling. Tests for liver function, bilirubin levels, imaging studies, and sometimes even liver biopsy are essential in diagnosing the cause. Treatment depends on a study for a specific liver disease, managing complications, and supporting the function of the liver, which may include antiviral drugs, abstinence from alcohol or medication in reducing inflammation.

3. Post Hepatic Jaundice: It is simply post-hepatic jaundice, more commonly called obstructive jaundice, caused by an obstruction to the flow of bile from the liver into the intestine. Obstruction leads to an accumulation of conjugated bilirubin in the blood. More common causes include gallstones, pancreatic or biliary tract tumours, and strictures in the bile ducts, among other diseases that include primary sclerosing cholangitis. Symptoms include yellowing of the skin and eyes, dark urine, pale or clay-coloured stools, and intense itching (pruritus) due to bile salt build-up. Other signs may include abdominal pain, nausea, and weight loss, depending on the underlying cause. Diagnosis involves blood tests showing elevated conjugated bilirubin and liver enzymes, as well as imaging studies like ultrasound, CT, or MRI to locate the obstruction. Treatment for blocking the intestinal part involves surgical techniques, endoscopies such as ERCP, and drugs for relief of symptoms with underlying disease condition.

The Role of Churna as Natural Remedies for Treatment of Jaundice

Churna made from Bhumi Amala, Holy Basil, and Kutki is a traditional Ayurvedic preparation known for its significant role in supporting liver health and treating jaundice. This powdered formulation combines the unique therapeutic properties of its ingredients to address the root causes of jaundice, which typically involve impaired liver function and the accumulation of bilirubin in the blood.

Bhumi Amala or Phyllanthus niruri is one of the most important drugs in Ayurveda. It is also used in churna formulations mainly for liver problems. It has the ability to clean the liver by removing harmful toxins and providing protection to liver cells from damage caused by oxidative stress. Churna also possesses antiviral properties. The management of viral hepatitis-related jaundice was best done using Bhumi Amala churna.

Holy Basil (Tulsi) is another principal ingredient used for liver-supportive churna. It is widely known for being an adaptogenic, antioxidant, and anti-inflammatory agent, helps reduce the pressure on the liver, enhances detoxification, and strengthens the immunity to fight any underlying infection or inflammation causing jaundice.

Kutki (Picrorhiza kurroa) is a very important herb in Ayurvedic medicine, which is usually prepared as a churna. It stimulates the production of bile and ensures its proper flow, thereby helping the liver to process and eliminate toxins more efficiently. Its anti-inflammatory and antioxidant effects protect liver cells from further damage and support their repair and regeneration. When these herbs are ground into a fine powder and consumed as a churna, their active compounds work synergistically to improve liver function, stimulate digestion, and facilitate the breakdown and excretion of excess bilirubin, which is the hallmark of jaundice. The churna can be taken with warm water, honey, or as directed by an Ayurvedic practitioner. Regular use may help restore normal liver function, reduce symptoms like fatigue and yellowing of the skin, and support overall health.

The Role of Juice as Natural Remedies for Treatment for Jaundice

Juice made from natural ingredients like Bhumi Amala, Holy Basil, and Kutki can be beneficial in the treatment of jaundice due to their various therapeutic properties. Bhumi Amala, also known as Phyllanthus niruri, is traditionally used for its liver-supportive benefits, helping to detoxify the liver, reduce inflammation, and aid in the healing process. Holy Basil, or Tulsi, is known for its antioxidant, anti-inflammatory, and immune-boosting properties, which help in improving overall liver health and reducing the oxidative stress that contributes to jaundice. Kutki, or Picrorhiza kurroa, is valued for its ability to enhance liver function by stimulating bile production and promoting better digestion. These three ingredients together can support liver function, promote detoxification, and help alleviate symptoms of jaundice. Bhumi Amala, Holy Basil, and Kutki are some of the juices that have been considered potent natural remedies for supporting liver health, especially in conditions like jaundice. Each ingredient has unique properties that enhance liver function and detoxification, which are critical for managing jaundice.

Bhumi Amala, or Phyllanthus niruri, is a strong herb that has been known for its hepatoprotective and anti-inflammatory properties. It works by enhancing the liver's capacity to remove toxins and regenerate damaged liver cells, which is crucial in jaundice, a condition marked by the liver's impaired ability to process bilirubin. It also has antiviral properties, making it helpful if jaundice is caused by hepatitis infections.

Holy Basil is widely used in traditional medicine for its benefits to human health. In the context of jaundice, it aids through the protection of the liver due to the reduction of oxidative stress and also through the promotion of overall liver functionality. The adaptogenic properties of Tulsi help the body to render with stress which often worsens liver dysfunction. Immune system support also helps in fighting infections that can cause or even worsen jaundice.

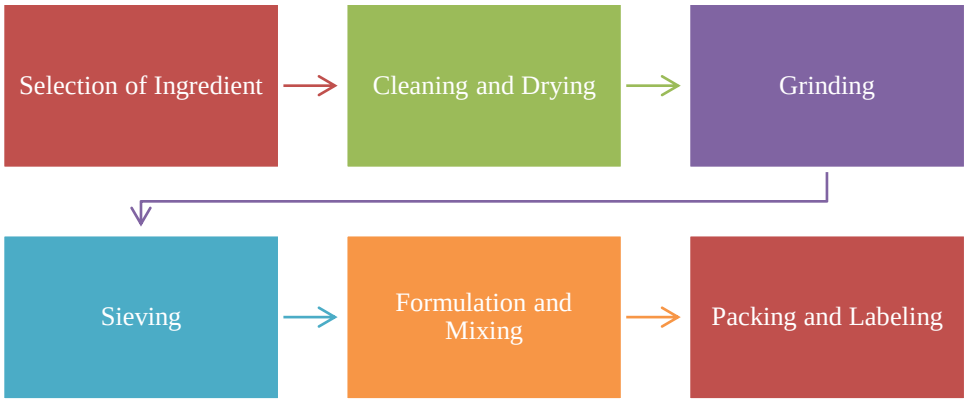
Kutki (Picrorhiza kurroa) is one of the best known herbs for maintaining liver health. The choleretic potency of the herb would mean promotion of bile production and flow which would break down the fat and clear toxins. Its anti-inflammatory and antioxidant properties would prevent damage to liver cells, therefore help in repair and regeneration.

These ingredients together make a synergistic blend which can be very helpful in liver detoxification, improve the production of bile, reduce inflammation, and help with jaundice treatment. For preparation of the juice, fresh or dried forms of these herbs are often mixed with water or other appropriate bases. It’s important to consume such remedies under the guidance of a healthcare professional to ensure safe and effective use, as they may interact with medications or specific health conditions.

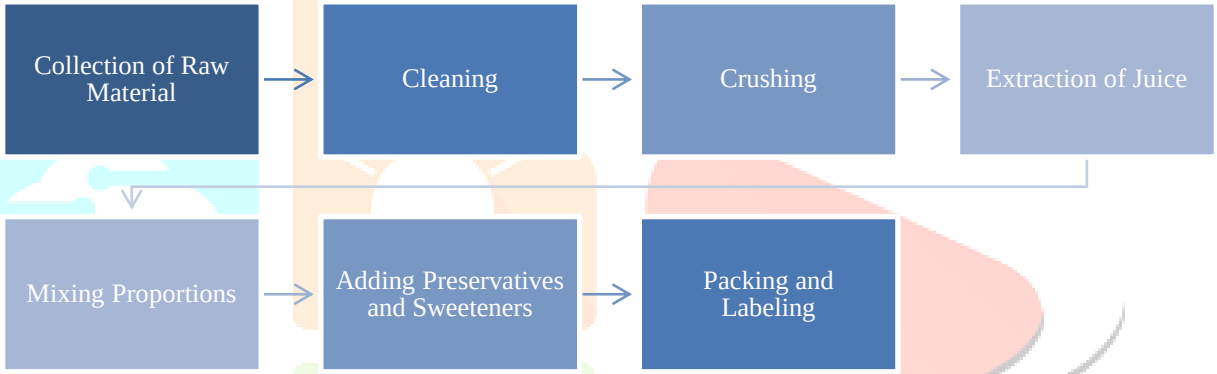
II. PLAN OF WORK

- Selection and collection of Bhumi amala, Kutki, and Holy basil.
- Preparation of Extraction of Bhumi amala, Kutki, Holy basil.
- Chemical Test for Identification for Bhumi amala
  1) Test for identification of Alkaloids.
  2) Test for identification of Flavonoids
  3) Test for identification of Tannins
- To perform preformulation and compatibility studies for different excipient and extract.

Method of Preparation of Churna



Method of Preparation of Juice



III. EVALUTION OF CHURNA AND JUICE

Churna	Juice
Organoleptic Evaluation	
Physicochemical Evaluation	
Phytochemical Evaluation	
Stability Studies	
HPLC	
Thin Layer Chromatography	
Therapeutic Evaluation	
Efficacy Testing	

IV. ACTIVE INGREDIENT AND EXCIPIENTS

DRUGS	SYNONYM	BIOLOGICAL SOURCE	FAMILY	CHEMICAL CONSTIUENTS	THERPEUTIC USES
1. BHUMI AMALA 	Euphorbia hirta (local context), Chanca piedra (South America), Stonebreaker.	Phyllanthus niruri is the small annual herb that is found in the tropical and sub-tropical regions, including India, Southeast Asia and South America.	Euphorbiaceae	1. Lignans 2.Alkaloids 3.Flavonoids 4.Glycosides 5.Tannins	Jaundice and hepatitis, Kidney stone, Urinary Tract Infection, Detoxification.
2. HOLY BASIL 	Tulsi, Sacred basil	Ocimum sanctum is a sacred plant mainly grow or cultivated in the region of India and Southeast Asia. It is a small shrub or an herb which have aromatic leaves	LamiaceaeFR5	1.Essential oils 2.Flavonoids 3.Phenolic Compound 4.Triterpenoids 5.Vitamins and Minerals	Stress and Anxiety, Immune support, Diabetes Management, Respiratory Health, Heart health, Liver health, Skin Health
 3.KUTKI	Picrorhiza scrophulariflora, Kutki	Picrorhiza kurroa is a perennial herb that grow mainly in high altitude region of Himalayas, typically at the elevation between 3,000 to 5,000 meters. The plant is narrow, has lanced shaped leaves, and has pale blue and white flowers	Scrophulariaceae	1.Iridoid Glycosides 2.Triterpenoids Picroside I Picroside II Kutkoside Luteolin	Liver Disorder, Digestive Health, Skin Condition, Digestive Health, Skin Condition, Respiratory Health, Detoxification, Weight Management
	IUPAC NAME	SOURCES OF CITRIC ACID	PROPERTIES OF CITRIC ACID	CHEMICAL PROPERTIES	USES OF CITRIC AICD

4.CITRIC ACID 	2-Hydroxy-1,2,3-propane-tricarboxylic acid	It is found in the high concentration in citrus food such as lemons, lime, oranges and grapefruit. Other fruits such as strawberry, raspberry contains low amount of citric acid	White crystalline powder or colorless crystal It is highly soluble in water It is a weak acid (pKa values:3.13, 4.76, 5.41). Its pH is around 2-3 in water	1.Acidic Nature 2.Chelation: Citric acid binds to metal ion and form chelated complexes 3.Ester: Citric acid can form ester, known as citric ester	Flavoring Agent Preservatives Antioxidant Cosmetics and Personal care products Effervescent Tablet Cleaning household product Water treatment Textile Industry
	SOURCES OF JAGGERY	COLOUR OF JAGGERY	TASTE OF JAGGERY	ODOUR OF JAGGERY	BENEFITS OF JAGGERY
5.JAGGERY 	1.Sugarcane Jaggery (Most common type) 2.Palm Jaggery (less common but widely used in tropical region) i)Date Palm (Phoenix dactylifera) ii)Coconut Palm (Cocos nucifera)	1.Sugarcane Jaggery typically has golden to dark brown color. 2.Palm Jaggery can vary from lighter amber to dark brown color.	Sweet and rich flavor and has a distinct, deep, caramel like sweetness.	Jaggery has sweet, aromatic fragrance that is described as warm, earthy, and slightly molasses like. The odor is usually pleasant and comforting	1.Rich in Iron 2.Detoxification 3.Boost Immunity 4.Digestive health 5.Respiratory Health 6.Improves skin

V. SUMMARY AND DISCUSSION

The aim of this project is "Formulation and Evaluation of Herbal Churna and Juice as a Liver Tonic for the Treatment of Jaundice" which is often related to liver dysfunction. This research integrates traditional Ayurvedic knowledge with modern scientific techniques to provide a safer and more holistic alternative to synthetic drugs. As such, the project is categorized into two phases: formulation and evaluation. The formulation involves preparing herbal churna (powder) and juice using hepatoprotective, antioxidant, and anti-inflammatory herbs, while the evaluation phase will assess their physical, chemical, and therapeutic properties. With a rising demand for herbal medicines, this project addresses the need for effective liver treatments. Key herbs such as Phyllanthus niruri, Picrorhiza kurroa, *Ocimum sanctum* known for their liver-supporting properties, will be used. The evaluation will include tests for safety, efficacy, and stability, as well as in-vitro and in-vivo studies to confirm the effectiveness of the formulations.

The project will provide a natural liver tonic for the management of jaundice, contributing to the growing field of plant-based medicine, though safety, consistency, and regulatory requirements need to be addressed.

VI. CONCLUSION

This project "Formulation and Evaluation of Herbal Churna and Juice as a Liver Tonic for the Treatment of Jaundice" has good scope for developing a natural, active remedy for jaundice, which is essentially related to liver dysfunction. The herbal drugs used in this formulation are Bhumi Amala (Phyllanthus niruri), Kutki (Picrorhiza kurroa), and Holy Basil (Ocimum sanctum) are known as hepatoprotective, anti-inflammatory, and antioxidant molecules. These herbs have been used in traditional medicine to support the health of the liver and improve detoxification processes.

Although the formulation and evaluation of the churna and juice have not yet been conducted, the planned research will focus on combining these herbs in a balanced and effective formulation. The evaluation phase will aim to assess their physical, chemical, and therapeutic properties, as well as their overall safety and efficacy in treating jaundice. Scientific validation through in-vitro and in-vivo studies will further strengthen the credibility of these herbal remedies.

This project is an attempt to contribute to the increasing body of research on herbal medicines and to offer a holistic, safer alternative to synthetic drugs for liver ailments. With the problems related to formulation consistency, safety, and regulatory concerns, the expected outcome would be the development of an effective liver tonic that can help manage jaundice and improve liver function. Ultimately, this might be one step toward broadening the options regarding the therapeutic liver health remedies across the world against the backdrop of increasing demands to have more nontoxic alternatives.

VII. REFERENCES

1)"Ethno-medicinal Plants Traditionally Used for the Treatment of Jaundice (Icterus) in Himachal Pradesh in Western Himalaya"
Author: Disha Raghuvanshi, Rajni Dhalaria, Anjali Sharma, Dinesh Kumar , Harsh Kumar, Martin Valis, Kamil Kuča, Rachna Verma, Sunil Puri.
Journal: National library of science.
The document discusses the Ayurvedic drugs against jaundice that is bhumi amala, Kutki, and swarasa preparations. These herbs are shown to have strong hepatoprotective, anti-inflammatory, and antioxidant activities. The report underlines various parameters of the stability and absorbance profiles between the two preparations, particularly their potential in pharmacy applications. Recommendations for further action include a need for clinical trial and standardization before their integration into modern medicine. Jaundice is a clinical condition that presents with yellowing of the skin and eyes, primarily due to elevated bilirubin levels caused by liver dysfunction. Modern and traditional medicine systems have proposed various treatment options for jaundice, with Ayurveda offering promising natural remedies. The aim of this review of literature is to assess whether the Ayurvedic formulations, churna, and juice preparations based on Bhumi Amla (Phyllanthus niruri), Kutki (Picrocrhiza kurroa), and Holy Basil (Ocimum sanctum) hold potential as therapeutics in treating jaundice.
Link: https://pubmed.ncbi.nlm.nih.gov/33504029/

2) "Picrorhiza kurroa, Royle ex Benth: Traditional uses, phytopharmacology, and translational potential in therapy of fatty liver disease"
Author: Ashwinikumar Raut, H Dhami-Shah, A. Phadke, A. Shindikar, Shobha Udupi, J. Joshi, Rama Vaidya, A. Vaidya
Journal: National Institutes of Health
This research is on the development and validation of an herbal syrup for jaundice treatment by using liver-supportive herbs like Bael, Giloy, Aloe Vera, Tulsi, and Papaya leaves. The syrup was formulated through maceration and standardized for consistent potency. Quality tests, preclinical studies, and clinical trials have demonstrated its efficacy in reducing bilirubin levels and improving liver function. Herbal syrups are natural, holistic, and safer alternatives with fewer side effects compared to chemical syrups. Conclusion: The syrup meets quality standards and has potential as an effective and safe treatment for jaundice, combining traditional medicine with scientific validation. The herbal syrup meets required quality standards and offers a promising solution for liver health. It combines traditional medicine and scientific validation to provide an effective, safe, and holistic treatment for jaundice

Link: https://pubmed.ncbi.nlm.nih.gov/35659739/

3) "Bhumyamalaki in the management of jaundice a Comprehensive Review"
Author: Chaithra L. N., Mahalakshmi K. S. and Dr. Kavitha P. N.
Journal: World Journal of Pharmaceutical and Life Sciences
The article reviews Bhumyamalaki (Phyllanthus niruri) as a potential herbal treatment for jaundice. It highlights the plant's hepatoprotective, antioxidant, anti-inflammatory, and immunomodulatory properties. Clinical studies show it reduces bilirubin levels, improves liver enzymes, and alleviates symptoms. The herb works by reducing oxidative stress, enhancing liver detoxification, and promoting bile secretion. It is traditionally used in Ayurveda for liver ailments and considered safe within recommended doses, though rare side effects may occur. The article concludes that Bhumyamalaki is a promising remedy for jaundice but calls for further research and clinical trials for validation and standardization. Jaundice results from high bilirubin levels and is associated with liver dysfunction caused by hepatitis, alcohol-related diseases, and bile obstructions. While modern medicine provides treatments, alternative remedies like Bhumyamalaki are increasingly explored for their effectiveness. Bhumyamalaki is a promising herbal remedy for jaundice, with a strong safety and efficacy profile. Further studies, including randomized controlled trials and standardization, are essential to establish its role in modern medicine.
Link: https://www.wjpls.org/home/article_abstract/3371

4) "Ethno pharmacological Approaches for Therapy of Jaundice: Part II"
Author: Devesh tewari, Andrei Mocan, Emil D. Parvanov, Archana N. Sah
Journal: Frontiers in Pharmcology
The article presents ethno pharmacological approaches for jaundice treatment using medicinal plants from five key families: Acanthaceae, Euphorbiaceae, Asteraceae, Combretaceae, and Fabaceae. Key plants include: 1. Andrographis paniculata: Contains andrographolide, reduces bilirubin, improves liver enzymes, and offers hepatoprotective and anti-inflammatory effects.2. Phyllanthus species: Traditional remedy for jaundice and hepatitis B, with antioxidant and hepatoprotective properties. 3. Silybum marianum (Milk Thistle): Active compound silymarin supports liver regeneration and reduces bilirubin levels. 4. Terminalia chebula: It is an antioxidant and liver-protective agent that is effective in drug-induced liver damage. 5. Glycyrrhiza glabra (Licorice): Glycyrrhizin is used for chronic hepatitis, showing hepatoprotective and antiviral activity. Conclusion: These plants have great promise for the treatment of jaundice, especially in reducing the bilirubin level and the protection of the liver. Standardized clinical trials are needed to confirm efficacy and ensure safe use in modern medicine.
Link: https://www.frontiersin.org/journals/pharmacology/articles/10.3389/fphar.2017.00519/full

5) "Jaundice: a basic review"
Author: M. Abbas, S. Talha, M. Ashraf,
Journal: International journal of Research in medical sciences
The article "Jaundice: A Basic Review" offers a comprehensive analysis of jaundice, meticulously breaking down the condition into its three primary types: pre-hepatic, hepatic, and post-hepatic. Pre-hepatic jaundice arises due to excessive hemolysis, where the destruction of red blood cells leads to an overproduction of bilirubin that the liver cannot process effectively. Hepatic jaundice is linked to liver dysfunction caused by conditions such as hepatitis, cirrhosis, or drug-induced liver injury, impairing the organ's ability to conjugate and excrete bilirubin. Post-hepatic jaundice, on the other hand, results from biliary obstruction caused by gallstones, tumors, or strictures, which hinder the flow of bile and lead to an accumulation of conjugated bilirubin. The article underscores the significance of understanding these distinct mechanisms to enable accurate diagnosis and targeted interventions.
Link: https://www.researchgate.net/publication/301827753_Jaundice_a_basic_review

6) "An Ayurvedic Drug review of Bhumi Amalaki (Phyllanthus Niruri)"
Author: Pradip Mishra, M. Bhaskar, Kuldeep Pandey.
Journal: Research get Publication
The document provides a comprehensive review on Bhumi Amla or Phyllanthus niruri, highlighting medicinal importance in Ayurveda's traditional pharmacopeia and modem pharmacology. Bhumi Amla, a small shrub found in warm and temperate regions, exhibits hepatoprotection, free radical scavenging, antiviral, and anticancer actions. Traditionally, it has been used for diseases like liver-related disorders, nephrolithiasis, and viral infections as a result of bioactive molecules such as flavonoids, tannins, and lignans. The herb shows

anti-inflammatory, immunomodulatory, and detoxification properties and is capable of treating disorders like jaundice and liver damage. The review outlines the plant's phytochemical composition, which includes phyllanthin and hypophyllanthin to protect liver cells and combat oxidative stress. Further, it mentions its role in enhancing immunity and preventing various ailments such as cancer and hepatitis. The conclusion calls for further pharmacological research to establish its traditional applications and assess its potential to address severe diseases.
Link: https://www.researchgate.net/publication/377724406_An_Ayurvedic_Drug_review_of_Bhoo-Aamalaki_Phyllanthus_Niruri

7) "Neonatal Jaundice Casual Factors: A Literature Review"
Author: P. Anais, A. Astuto, S. Sharma
Journal: Women, Midwives and Midwifery Journal
This article focuses on Jaundice (neonatal icterus), known as yellowish baby is a condition where the yellowing of the skin and sclera in newborns, due to increased levels of bilirubin in the blood (hyperbilirubinemia) which subsequently causes an increase in bilirubin in the fluid outside the cell (extracellular fluid). Jaundice is one of the contributors to infant morbidity in Indonesia because it can cause the baby's body to become limp, unwilling to suck, increased muscle tone, stiff neck, muscle spasms, convulsions, sensory disturbances, mental retardation, disability, and even death. The factors causing the occurrence neonatal jaundice are more focused on health problems of birth weight of babies, gestational age, asphyxia, infection, length of labor, frequency and sex. There are still few studies that examine the factors associated with factors that cause jaundice in neonates.
Link: https://wmmjournal.org/index.php/wmm/article/view/81

8) "Hepatoprotective effects of Bioactive Compounds from Traditional Herb Tulsi (Ocimum Sanctum Linn) against galactosmine-Induced Hepatotoxicity in Rats"
Author: Fatemah o Kamel Shahid Karim, Sabna Kotta
Journal: National Library of medicine
This review focuses on Ocimum sanctum L. (Tulsi; Family: libiaceae), also known as "The Queen of herbs" or "Holy Basil," is an omnipresent, multipurpose plant that has been used in folk medicine of many countries as a remedy against several pathological conditions, including anticancer, antidiabetic, cardio-protective, antispasmodic, diaphoretic, and adaptogenic actions. This study aims to assess *sanctum* L.'s hepatoprotective potential against galactosamine-induced toxicity, as well as investigate bioactive compounds in each extract and identify serum metabolites. The extraction of *sanctum* L as per Ayurveda was simultaneously standardized and quantified for biochemical markers: rutin, ellagic acid, Kaempferol, Caffeic acid, quercetin, and epicatechin by HPTLC. Hepatotoxicity was induced albino adult rats by intra-peritoneal injection of galactosamine (400 mg/kg). The quantified hydroalcoholic and alcoholic extract of *sanctum* L (100 and 200 mg/kg body weight/day) were compared for evaluation of hepatoprotective potential, which were assessed in terms of reduction in histological damage, change in serum enzymes such as AST, ALT, ALP and increase TBARS.
Link: https://pubmed.ncbi.nlm.nih.gov/37860117/