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A Review on Medicinal Plants Used in Treatment of Jaundice

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ABSTRACT:

Liver is the most important vital organ of our body and is the most responsible organ for metabolism and secretory activities. Jaundice is the major cause for the morbidity and mortality across the world. Liver problems is the worldwide problem in humans. Jaundice is the diseases, which directly affect the liver organ and production of bilirubin increases. This disease can occur in adults, child and even in elders. The jaundice is the life-threatening disorder, which is divide into the two parts, one is pre-hepatic, and another is post-hepatic. In jaundice bilirubin plasma level increases which results in diarrhoea, gastrointestinal bleeding, anaemia, edema, weight-loss, lethargy, seizures, coma and even death. There are many medicinal plants used in treatment of jaundice with less side effects. There are wide varieties of herbs and plants that have high efficacy to cure the jaundice. So, there is need to analyse this medicinal plant used for treatment of Jaundice. In present study we have concise the different analytical methods UV, HPLC, HPTLC etc. for the analysis of medicinal plants.

KEY WORDS: Jaundice, hepatoprotective activity, Analytical methods, medicinal plants.

INTRODUCTION

The liver is one of the most important organs of our body its main function of the liver is to metabolize and detoxify food, drug, and chemicals in the liver. Toxic substances such as carbon tetrachloride, antibiotics, microorganism, and chronic alcohol consumption mainly cause liver damage. There are development of different types of liver diseases/disorder such as hepatitis A, hepatitis B, hepatitis C, jaundice, cirrhosis, liver cancer, hemolytic anemia, etc. [1] The common cause of the liver disorder is inflammation mainly caused due to the excessive consumption of alcohol, poor diet, malnutrition. Jaundice is one of the common amongst the different types of liver disorders. Jaundice is not a disease, but it is a symptom of the liver disease, which leads to indicates liver malfunctioning. It is not a disease, but it is a symptom of the liver disease, which indicates liver malfunctioning. Jaundice is derived from the French word 'Jaune' means 'yellow' and it is distinguishing by yellow pigmentation. It is also known as icterus, which means yellow pigmentation of skin, mucous membrane, and sclera due to an increase in the level of bilirubin in the blood and this condition is called hyperbilirubinemia. This may be caused by a various number of conditions, an inflamed liver and hindrance in bile duct.[2] Liver diseases cause the morbidity and mortality across the world. According to the WHO estimates, about 1.5 million cases of hepatitis A occur yearly and 2.5 billion people worldwide are mostly infected with the hepatitis B virus. Despite of immense advances made in allopathic medical practices, herbs play an important role in the management of various liver diseases. A large number of plants and formulations have been declared to have hepatoprotective activity. Jaundice is the most common of all liver disorders.

Woefully, conventional and synthetic drugs used in the treatment of liver diseases are insufficient and sometimes can have serious side effects. Toxic liver injury produced by drugs and chemicals may practically imitate any form of naturally occurring liver diseases. Hepatotoxicity from drugs and chemicals is the commonest form of iatrogenic diseases. Some Inorganic compounds producing hepatotoxicity are Arsenic, Phosphorus, copper and iron. Organic compounds including certain naturally occurring plant toxins such as Pyrrolizidine alkaloids, mycotoxins and bacterial toxins. [3]

Introduction to Jaundice:-

Jaundice is an occurring yellowing of the skin, whites of the eyes and body fluids. There is an increase in amount of bilirubin in the blood. Bilirubin is a yellowish pigment that is produced and it is secreted into the duodenum to be overcome of waste products such as bilirubin and excess cholesterol and to aid in the digestion of fats. Jaundice may arise from increased in red blood cells, changes in bilirubin metabolism, liver damage, and if there is interference with bile excretion. About 1% of our red blood cells retire every day, to be replaced by fresh red blood cells. The liver and disposed of much of the resulting bilirubin leaves the body. According to the pathophysiology of jaundice and metabolism of bilirubin, there are three types of jaundice, which includes-

1. Pre-hepatic jaundice which give rise to due to the haemolysis of red blood cell.
2. Hepatic jaundice which give rise to due to the abnormal metabolism and excretion of bilirubin by the liver.
3. Hepatic jaundice caused due to the obstruction in the bile duct.[2]

EPIDERMIOLOGY:-

The prevalence of jaundice varies with age and sex, newborns and elder are most often affected. Approximately 20% of newborns develop jaundice in the first week of life, primarily because of immaturity of the hepatic process. Hyperbilirubinemia is the most common problem caused to infant in the immediate neonates. Viral hepatitis A is the most frequently cause of jaundice in school-age children. Common duct stones, alcoholic liver disease and neoplastic jaundice occur in middle-aged patients and in older patients. Hepatitis A was found to be the mostly cause of jaundice in children. Bile duct stones, drug-induced liver disease, and malignant biliary obstruction occur in the elderly patients. Men have an increased prevalence of alcoholic and non-alcoholic cirrhosis, chronic hepatitis B. women denate higher rates of gallbladder stones or cancer. Kernicterus, a complication of severe jaundice may cause of death in neonates.[4]

ETIOLOGY:-

- Peri-hepatic cause
- Intra-hepatic causes
  - Unconjugated hyper bilirubinaemia
  - Conjugated hyper bilirubinaemia
- Post-hepatic causes

Peri hepatic causes:-

Unconjugated hyperbilirubinemia results from a deflect of the necessary bilirubin conjugation in the hepatocyte. This problem occurred before bilirubin has entered the hepatocyte or within liver cell. Excessive heme metabolism, from haemolysis or reabsorption of a large hematoma, results in significant increases in bilirubin, which may overcome the conjugation process and lead to a state of unconjugated hyperbilirubinemia.

Intrahepatic Causes:-

Unconjugated hyper bilirubinaemia:-

There are various degrees of unconjugated hyperbilirubinemia, depending on the enzyme inhibition with each disease. Gilbert syndrome is a common, hereditary disorder that affects approximately 5% of the U.S. population. The disease results in a decrease in the activity of the enzyme glucuronosyltransferase, causing an increase in the indirect serum bilirubin. Gilbert syndrome is an incidental finding on routine liver function tests, when the bilirubin level is normally increased and all other liver function values are within normal limits. Jaundice and increase of the bilirubin level may occur during periods of stress, fasting, or illness.

Conjugated hyper bilirubinaemia:-

The mainly causes of conjugated hyperbilirubinemia are intrahepatic cholestasis and extrahepatic obstruction of the biliary tract, with preventing bilirubin from moving into the intestines. Autoimmune diseases, viruses etc. are the most common causes of hepatitis. Intrahepatic inflammation disturb transport of conjugated bilirubin and causes jaundice Alcohol has been shown to affect bile acid uptake and secretion, resulting in the cholestasis. Chronic alcohol use may cause in fatty liver, hepatitis, and cirrhosis, with different levels of jaundice. Fatty liver, the most common progress to cirrhosis. Hepatitis occur due to alcohol use typically result into acute onset of jaundice and more severe symptoms. Liver cell necrosis is indicated by highly elevated serum liver transaminase levels many drugs have been shown to play a role in the development of cholestasis jaundice. Agents classically identified with drug-induced liver disease are acetaminophen, penicillin, oral contraceptives, chlorpromazine (Thorazine), and estrogenic or anabolic steroids. Cholestasis can develop during the first few months of oral contraceptive use and may result in jaundice.

- Post hepatic: - conjugated hyperbilirubinemia also may result from problems that occur after the bilirubin is conjugated in the liver. These post-hepatic causes can be divided into intrinsic or extrinsic obstruction of the duct system Jaundice also may arise secondary to pancreatitis.

  The most common causes of pancreatitis are gallstones and alcohol use.[5]

PATHOPHYSIOLOGY:-

Approximately 250mg of bilirubin produced per day by an average adult person through the breakdown of the heme molecule. Heme is released during red blood cell demolition. Unconjugated bilirubin is lipid soluble and passes easily through cell membranes to bind to albumin in serum, whereas free (unbound) bilirubin is taken up by liver hepatocytes and converted to conjugated bilirubin. Conjugated bilirubin is water-soluble and is also transported from liver hepatocytes into the biliary tract system where passes to the intestines and it is excreted into the stool. Some of the conjugated bilirubin is reabsorbed as urobilinogen. Jaundice occurs when there are disrupt along this metabolic pathway, causing an increase in unconjugated bilirubin or conjugated bilirubin. [6]

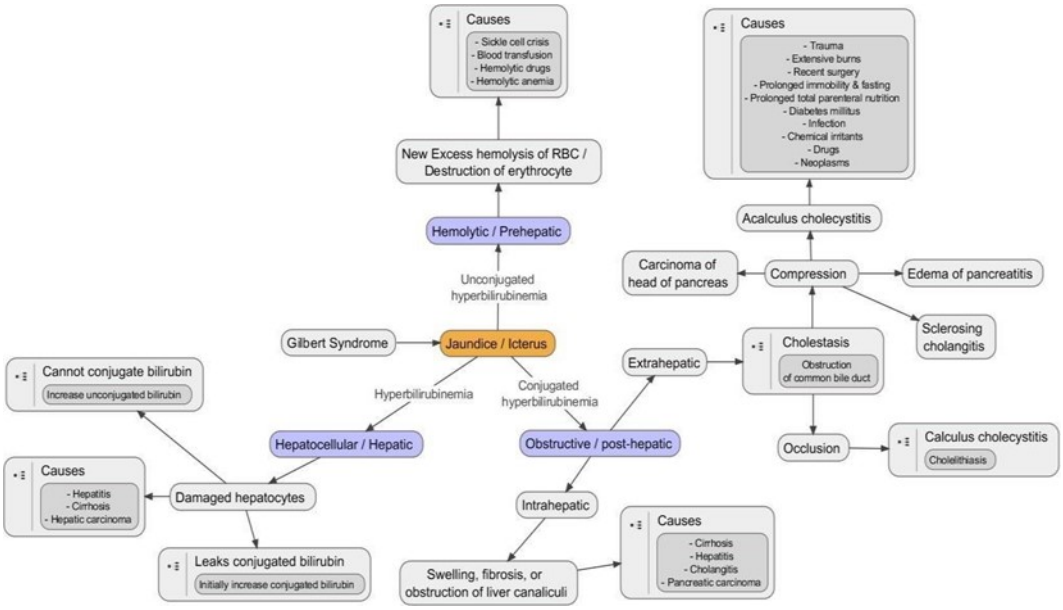

Figure 1 FIG:- 1 OVERVIEW OF JAUNDICE[46]

INVESTIGATION AND MANAGEMENT OF JAUNDICE:-

INVESTIGATION

♣ Imaging
♣ Liver biopsy
♣ Staging
♣ Preoperative drainage of the biliary tree
♣ Contrast-enhanced multisite CT
♣ Staging laparoscopy
♣ Endoscopic ultrasound

MANAGEMENT:-

♣ Bile duct stones
• Several other options are available have revealed bile duct stones;
• Physical condition
• Comorbidity and medical history
• Previous attempts at intervention
• If the patient has had a cholecystectomy
•Availability of equipment/theatre/anaesthetics/expertise of interventionist
• Patient preference.
♣ ERCP sphincterotomy
♣ Laparoscopic exploration of the common bile duct
♣ Malignant strictures
♣ Benign strictures [7]

USE OF MEDICINAL PLANTS IN TREATMENT OF JAUNDICE:-

The traditional system of health can be used to treat illnesses. Traditional medicinal use of plants is related to physiological and pharmacological activity of medicinal plant ingredients. Jaundice is one of the common liver disorders affecting the citizens of both rural and urban Indians and is treated by both cultivated and wild plants. [8]
Liver, the largest gland is a vital organ. It is the metabolic "engine-room of the body". Almost all the drugs, food and water constituents used as such it is often exposed to diseases resulting in a number of clinical syndromes.
Liver, the largest gland is a vital organ. It is the metabolic 'engine-room of the body'. Almost every drugs, foods and water constituents metabolized and detoxified in the liver. Many chemicals, foods, drugs and infections (parasitic, bacterial, viral or fungal) can cause variety of liver diseases such as hepatitis, jaundice, liver cancer, etc. Because of variations in liver diseases and difficulties encountered in reaching to a proper diagnosis, a physician is rarely able to provide specific treatment. Liver has a central role in regulation of physiological processes. It is involved in

several functions like metabolism, secretion and storage. Detoxification of various drugs and occurs in the liver. The bile secreted from the liver has an important role in digestion. Liver diseases are the most serious disorders.

The medicinal plants contain phytochemicals, which possess strong antioxidant activities. These antioxidant phytochemicals may be flavonoids (flavones, isoflavones, flavanones, anthocyanin, catechins, isocatechins, and quercetin), terpenoids, polyphenols (ellagic acid, Gallic acid and tannins), alkaloids, saponins, vitamins (A, C, E, K), carotenoids, minerals (copper, manganese, zinc, iodine), enzymes (catalase, glutathione peroxidase), polysaccharides, saponins, lignin, xanthones and pigments, etc. The antioxidants cure different diseases by protecting the cells from damage caused by 'free radicals'- the highly reactive oxygen compounds.

Medicinal plants are immunomodulatory property. They are both nonspecific and specific immunity. These plants may promote host-resistance against the infection by re-establishing the body-tissues. It is assume that the cure and renewal power of theseplant materials might be due to their action on host immune system. The immune system is also a complex in nature, and it consist of multi-organ and cell. It is one of the most sensitive systems of the body, which works through a complex regulation of cellular and humoral components.[9][10]

Table 1 LIST OF MEDICINAL PLANTS USED IN TREATMENT OF JAUNDICE:- [11-45]

SR NO	SCIENTIFIC NAME	COMMON NAME	FAMILY	CHEMICAL CONSTITUENTS	PARTS USED	ANALYTICAL AND BIOANALYTICAL METHOD
1	Andrographis	Kalmegh	Acanthaceae	Andrographolide, 14-deoxy andrographolide, 14 –deoxy 12-hydroandrographolide, β-sitositerol, stigmasterol, β sitosteryl fatty acid	Leaves and tender shoot	RP-HPLC, HPTLC
2	Ricinus Communis	Castor	Euphorbiaceae	Ricinus, 3-carboxy 4-methoxy N-methyl-2-Pyridone, N-dimethyl ricinine Quercetin	Roots, leaves and seeds	HPLC, LC/MS, ELISA, MALDI, FTIR, GC-MS
3	Boerhavia diffusa	Punarnava	Nytaginaceae	Punarnavine, β-sitosterol, liriodendrin, Boerhavine, Flavone, 5'-7'- dihydroxy	Dried herbs	HPLC, TLC, UPLC, AAS, HNMR, HPTLC
4	Azadirachta indica	Neem	Meliaceace	n-hexacosanol and amino acid, 7-desacetyl-7-benzoyl azadiradione, 7-desacetyl-7-benzoylgedunin	Aerial parts	GC-MS ANALYSER, UV
5	Curcuma longa	Haldi	Zingeberaceae	Zingiberine, Curlone, arcurcumne, santalene, sesquiphelladrene (Z), ocimene,phellandrene	Rhizome	FT-IR, FT-NMR, FT-RAMAN, UV, NMR, HPLC, HPTLC, LCMS/MS
6	Eclipta alba	Bhringraj	Asteraceae	Phytosterol, amyrin, triterpene, luteolin, caffeic acid	Fruits	LC/MS, UV, HPLC, HPTLC
7	Phyllanthus niuris	Bhuiamla	Euphorbiaceace	Nitetralin, phltetralin, geraglin, corilagin, gallocatechin, epicatechin	Whole plants	HPTLC, HPLC
8	Withania Somnifera	Ashwagandha	Solanaceae	Isopelletierene, anaferine, cusoophygrine, withanolides	Leaves	HPLC, HPTLC, UV
9	Swertia Chirata	Clearning nut	Gentianaceae	Xanthonoids, Flavanoids, Terpenoids, Secoirridoid	Entire herb	RP-UFLC, RP-HPLC, HPTLC
10	Tinospora Cordifolia	Gulvel	Mennispermaceae	Furanolactone, diterpene, Tinosporina giloin	Whole plant	HPLC, HPTLC
11	Dioscorea belophylla	Khoialoo	Dioscoreaceae	Diosgenin, Sapogenin, Saponin, Allantoin	Leaves	UHPLC, MASS Spectroscopy, HPLC, GC-MS
12	Moringa oliferalam	Sajna	Moringeaceae	β-sitosterol, Vanillin, β-sitostenone, 4-hydroxymellin, Octaicosanoic acid	Leaf stem	UV, HPLC, HPTLC, UPLC-ESI, MS/MS
13	Langenarin Siceraria	Lau	Curcubitaceae	Curcubitatcin B,D,G,H, 22-deoxy Curcurbitacin, Curcurbitacin B	Leaves, fruits, stem, roots	HPLC , HPTLC

14	Kalanchoe pinnate	Pathorchi	Crassulaceae	Bryophyllin, Bryophyllol, Bryophollone, Bryophollenone, Bryophynol, Bersaldegenin	Leaves	LC/MS/MS, HPLC, UV, RPLC, LC-MS
15	Vitex negunado L	Nishinda	Verbenaceae	Vitexin, canophotecin	Root	UV, HPLC
16	Mimosa Pudica L	Lozzabotia	Fabaceae	Alkaloid mimosine, d-xylose, d-glucuronic acid, Quercetin, Jasmonic acid, Turgoin-plant hormone	Stem	UV-HPLC
17	Justicia adhatoda L	Bashok	Acanthaceae	Vaiscine, quinazoline, vaiscinone, deoxyvasicine, adhatodic acid, adhatodine, adhatonine, vasicionol	Leaf	UV-VIS, FTIR, LC-MS/MS, RP-HPLC
18	Avverhora Carambola L	Kamranga	Oxalidaceae	Dihydroncyricetin, 2,3-dihydroflavanol	Fruits	HPLC, HPTLC, UV, FTIR, LC-MS
19	Nigella sativa linn	Kalonji	Ranumculaceae	Cuminaldehyde, Cuminic alcohol, nigellone, thymohydroquinone	Seed	HPLC, UV, HPTLC, UPLC
20	Terminalia arjuna	Arjuna (arjuna Kahu dhaval)	Combretaceae	Arjunolic acid, arjunic acid, arjungenin, arjunone	Stem bark, fruit	UV, HPLC

CONCLUSIONS:

From this review study, it is clear that medicinal plants play a significant role in treatment and management of jaundice. Several medicinal plants are used for the treatment of various liver diseases. The herbal medicines are safe and effective for world population and used in developing countries for primary health care because better cultural acceptability, compatibility with human body and less side effect. In present review, we have included various analytical methods like HPLC, HPTLC, UV, LC-MS, FT-IR, FT-NMR, which were successfully developed and validated, for analysis of different medicinal plants used for treatment of Jaundice.

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