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A Review on Ayurvedic Formulation (Kwath) for Treating Liver Disorder (Future Clinical Benefits)

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ABSTRACT

Ayurveda means knowledge of well-being concerns with life and longevity. Countries beyond India practices Ayurveda for healing various aliments in natural way by the involvement of herbs, minerals and natural resources which indeed heals the disease. Many combinations are need in different forms to treat different aliments. The best-known formulations are kwatha as it comprises of 90% resources which are mixed together either with/ without the addition of heat to release its active substances to possess various physiological and pharmacological activities. The present review will focus on the insights of this formulation which will be beneficial in treating liver disorder as liver is considered as the main part of metabolism.

Keywords: Phaltrikadi kwath, Kamala, Hepatoprotective drugs, Pandu, Herbal medicine, Dosha

INTRODUCTION

Ayurveda is orthodox masterly and trading liver disease since centuries and the drug toxicity emerge to be less as juxtaposed to mainstream medicine. Currently used medical therapies for liver disorder have high planned toxicity therefore physician hesitate to administrate modern medicine for life-Long term useful for clinical and animal research. Current century has finalized the efficacy of several medicinal plant and herbo-mineral compounds portrayed in ayurveda in the treatment of liver disease. It may be causation for patient with high-chronic liver disease and seek primary or adnoun herbal treatment and its standard occurrence observed across the globe [1].

Ayurveda Considered as traditionally Indian system of Medicine which has been need since centuries for treating various diseases due to its effectiveness and efficacy. This in term has led to an increase in the demand also due to side effects and toxicological related issues. The substances which are in this system of medicine are mainly from the natural resources hence their availability and should also be looked upon. Herbs consist of many active constituents either in minor or major parts which holds responsible for various pharmacological activities. One such activity is hepatoprotective as liver serves as a major component in human system which is considered for metabolism and excretion of substances or elements from the body. It's mainly responsible for secretary function and detoxification system of the body.

Contain dosage forms in Ayurveda used are asavas arista, lehyas, churna and bhasma. Among these which are need randomly are churna and asavas, but now a day's with kwath is also used at its maximum because of its administration and easily distribution in the human system. The formulation consists of multiple herb mixtures which directly or indirectly supports the hepatic system function increasing the immune property of the medicament. The silent disease affects and another in many parts of the country and sometime proven to be an epidemic one.

Ayurveda classic treasured a considerable of single and compound formulations for handling of various disorders. Phaltrikadi kwatha is a good-known compound formulation moot in various ayurvedic classics. It's cogent combination of ayurvedic herbs valuable for hepatic disorders. Two types of Phalatrikadi kwatha are mentioned in ayurvedic compendia having divergent herbs in Charaka Samhita and Bhaisajya-Ratnavali. It's prescribed for the management of prameha diabetes mellitus. Siddhasara Samhita PTK is mostly used as an antidote for liver disease by the name of phalatrikadi. In this context ptk accommodate 8 drugs namely-amalaki (*Emblica officinalis gaertn*), haritaki (*Terminalia chebula retz*), bibhitaki (*Terminalia bellerica roxb*), amrita (*Tinospora cardifolia miers*), vasa (*Adhatoda vasica nees*), katuki (*Picrrorrhiza kurroa royale ex benth*), kalmegha (*Andrographis panniculata nees*) and nimba (*Azadirahta indica a. juss.*). It's admeasurement that 350 million different all-around worldwide are infected with the virus, which cause 620,000 deaths worldwide each year. Phalatrikadi kwatha has been announces for the better management of kamala [2].

Morphology of liver

The liver: The largest soft-tissue structure, weight ranging from 1400-1600 g, lies protected under the diaphragm and the right lower ribs. When it enlarges, it can be palpated under the right costochondral margin, particularly on deep inhalation when the diaphragm pushes it down. The liver has a large right lobe, with an inferior quadrate segment and a posterior caudate segment. The left lobe is one-sixth of the right lobe. The gall bladder be prostrate in a fossa on the inferior facet but can be also watch anteriorly [3].

The blood supply of liver: Hepatic arterial and portal venous are precisely controlled and metabolically relevant. This fine-tunes the oxygen and substance supplies to different parts of the hepatic lobule. Lymphatic vessels of liver accompany hepatic venules, arteriolar capillaries, and biliary ductules. The lymphatics drain into lymph

glands in porta hepatis, glands around inferior vena cava and in the mediastinum. The nerve plexus of the liver originates from fibers of T_7 and T_{10} sympathetic ganglia *via* the celiac plexus. The liver cells are arranged in one-cell thick hepatic laminae or muralism. The liver capillaries are a specified vast labyrinth of a continuous network of lacunae–called sinusoids, kupffer cells line the sinusoids. There is a perisinusoidal space called the space of disse, with a network of argyrophilic fibers. Space is between the hepatic parenchymal and the littoral cells, with phagocytic and local blood-flow regulatory functions.

The liver lobule can be described as around the hepatic venule or as periportal lobule. The terminal furcates of portal veins, hepatic artery, and bile ducts constitute the portal triad. The hepatocyte has sinusoidal, biliary canalicular, and neighbor cell surfaces, without any basement membrane. Examination by electron microscopy has shown the liver to be composed of columns of a liver cell arranged in unicellular or at times in a multicellular pattern. The nucleus of the liver cells arranged in a unicellular pattern. The nucleus of the liver cells is composed of a dual membrane differentiated by the perinuclear space 40-50 μ wide. This membrane is constituted of pores 400-1000 an acting as a bridge between the nucleoplasm and the hyaloplasm by the act of pinocytosis or phagocytosis.

The golgi complex consists of vesicles of varied sizes and is sometimes surrounded by dense hyaloplasm. These vesicles either are empty or full of rounded particles of unknown nature. Golgi complex is found in between the nucleus and bile capillary, often very close to the latter. In the diseased cell, the golgi complex is rarely visible and appears during recovery [4].

Types of liver disorders

Pandu (Anaemia): Anemia is termed as pandu roga in ayurveda (Pandu=pale/pallor). Pathologically it is believed to be due to the vitiation of Rakta-Dhatu (blood) by an imbalance of Pitta-Vata dosa. It would be necessary to highlight here that tridosa-Vata, Pitta and Kapha maintain the body equilibrium and cause illness if vitiated or decreased.

Pandurogas (disease characterized by pallor) are of five kinds one each from Vata, Pitta, Kapha; fourth from the combination of all the three doses, and the fifth from eating clay.

In-person who indulges in over-exertion, alcoholic drinks, sour and salty food, eating clay, sleeping during the day, use of very pungent substances, the doses produce whitish-yellow discoloration of the skin by vitiating the Rakta (blood).

Primary reason for all the five forms of Pandu Rogas is the failure of the production of 'Ranjaka pitta' or its capacity to bind with other factors of the hemopoietic system. This results in the inability of the body system to impart the coloration to blood, which is due to the sluggish hepatic functions causing a derangement in the activity of pitta dosa [5].

Kamala (Jaundice): Ayurveda classifies two basic types of jaundice (kamala)-Kostha sakahasrita kamala and Sakhasrita kamala. Jaundice can be intrahepatic (svatantra) or extrahepatic (paratantra). Hemolytic hepatitis is associated with moderate to severe anemia. The prompt an annihilation of red blood cells and decreased hemoglobin promoted malarupa ranjaka pitta due to faulty diet and manner of living that increase pitta (Pittavardhaka Ahara and Vihara) leading to enhanced bilirubin creation. The obstructive jaundice is attributed to the tricky in the biliary flow due to Kapha dosa obstructing the route channels of the biliary system.

The stools will be clay-colored (tilapista nibha), in that is wager.

Deep yellow coloration of the eyes, skin, nails, and feces; reddish-yellow urine, skin color bear a resembling that of frog (greenish brown or brownish-yellow); weakness of sense organs, burning sensation, indigestion, weakness, debility, anorexia are the symptoms of kamala. It presumes both the Kosha (alimentary canal) and also the Sakha (Rakta) and other Dhatus (tissues). If left untreated, it makes the organs hard and turns into a more serious disease called Kumbha-kamala.

Raktapitta (Hemorrhagic disorders): The passage of blood is presented by through natural orifices located on the upper side of the body like nose, ear, eyes and mouth named as, 'urthvagata rakta pitta' or through the orifices located in the lower side such as genitalia, urinary tract or anus named as 'tiryak rakta pitta'. Sometimes the bleeding is from both upper and lower orifices simultaneously, which is a complicated condition.

Sotha (Inflammation/Oedema): Unlike the modern system of medicine, where any swelling is taken as a symptom of some disease, sodha is considered to be an independent entity in Ayurveda. There are various types, more particularly, Paittika type or Vata-Paittika type of that are the ones for which hepatic dysfunction is the root cause. They appear in the form of swelling below the eyes or on the lower limbs of the body. It is believed that if this is associated with ascites, it is indicative of severe liver damage and is generally incurable.

Yakrtadalyudara (Hepatomegaly): All diseases are produced due to mandagni (decreased digestive fire) especially so the udara roga (enlargement of abdomen). It occurs due to improper digestion of food, eating off dirty or spoiled food leading to the accumulation of waste products in the body. With that when vitiated Doshas obstruct the channel of sweat and other excretory channels of the body, effecting Prana and Apana Vaya which produce udara roga [6].

LITERATURE REVIEW

Medication use in people with liver disease

The best-known medication which can illness the liver is acetaminophen, also familiar as tylenol. This medication is universally available without a prescription and is coeval in many of the cold and flu remedies disposed of in drugstores also as in prescription cramp medications. Mickle pain medications that are attach labels to as "non-aspirin" have acetaminophen as its duct component.

Acetaminophen, when not new as directed, is extremely snug even for people with disease. However, catching an excessive amount of acetaminophen directly, or catching a high dose of acetaminophen continuously by gone several days can cause the bruise to the liver. Healthy one-off shouldn't come up with quite 900 mg of acetaminophen per dose, and should not come up with quite 3,000 mg in at some point. In extension, even healthy persons should avert delightful 3,000 mg of acetaminophen every day for likewise 3 to 5 days. Patients with disease should alleviate the everyday amount of acetaminophen to 2,000 mg every day, or even less if biting disease is relevant. Albeit you've no disease, always use the tiniest amount of acetaminophen needed to urge relief. It's significant that you merely read the labels of all prescription and non-prescription medications that you simply take hold of. Again and again acetaminophen could even be coeval in certain medications which could cause you to wish a dose of acetaminophen that exceeds the safe curb.

People who drink alcoholic liquor routinely are at bigger risk of developing biting liver damage from acetaminophen. Drinking alcohol routinely switch the way the liver breaks down convinced medications. Within the case of acetaminophen, alcohol use spends to accumulation within the liver of a toxic by product of acetaminophen which will kill the liver cells. People that drink alcohol routinely shouldn't acetaminophen or accept its law doses if in the least. With very limited exceptions, folks that have tepid disease can carefully take very familiar prescription and non-prescription medications at the praised dose. Having balmy disease like hepatitis C or liver disease doesn't raise the danger that an apt medication is going to be toxic to the liver, however, if an individual along pre-existing disease arise to develop liver injury from a medicine, the resulting liver cripple could also be more biting than would occur in the other way healthy person with

an equivalent reaction. For that reason, whenever possible, physicians adopt to use "liver-safe" medications once we are familiar that an individual has disease.

Often physicians could also be hesitant to start out patients on a cholesterol lowering medication if the liver tests are heretofore mildly hoisted; usually thanks to liver disease. Research has exhibited that cholesterol lowering medications are secure in people with liver disease or mild hepatitis C infection, and actually, could also be productive to the liver by decreasing inflammation. People with often critical sorts of disease like cirrhosis need to be more heedful esteem the kinds and dose of medicines they take. While the potential of the liver to decent break down and exploit medications is preserved flush when severe disease is present, there are some medications that ought to not be used or should be used at lessen dose when given to patients with advanced cirrhosis [7].

Potential of medicinal plants in liver disorder

Purposeful work, initiated for the revival of Ayurveda, entire over the country. Formulations, plants, diets, etc. Arogyavardhini, *Andrographis panniculata*, *Picrrorrhiza kurroa*, *Phyllanthus amarus*, *Luffa echinata*, *Punarnav adikvatha* etc. the spend obtained by these studies at certain centers were; *Acacia catechu*, *Andrographis panniculata*, *Azadirahta indica*, *Berberis arista*, *Cichorium intybus*, *Curcuma longa*, *Eclipta alba*, *Emblica officinalis*, *Indigofera tinctoria*, *Luffa echinata*, *Nymphaea stellata*, *Ocimum sanctum*, *Phyllanthus amarus*, *Picrrorrhiza kurrooa*, *Ricinus communis*, *Swertia chirayita*, *Tephrosia purpurea*, *Tinospora cordifolia*, *Trichopus zeylanicus*, *Wedelia calandulacea*, *Withania somnifera*, likewise two classical ayurvedic formulations.

The first double-blind randomized, placebo-controlled clinical trial, in Ayurveda, was conducted with Arogyavardhini and *Picrorhiza kurrooa*. This showed significant effects on cytoprotection and recovery of the liver function. Prof. Baruch Blumberg, the noble laureate for the discovery of hepatitis B virus, had worked on *Phyllanthus amarus*, with Thyagarajan and others. They showed a dramatic clearance of HBsAg. There are many more potential medicinal plants that can be taken up to logical ends for effective and safe drugs for liver disorders [8].

Importance of kwath

Acquiesce to ayurvedic pharmacy, kwath is one a part of the coarse drug to be carbuncle with sixteen parts of water to be diminished up to a gutter one eighth. But there's a variation of opinion amid Acharya about the inclusion of water, vessels to be not new, and therefore the extent of heating. The exertion of earthen pot is outmoded now each day because it isn't applicable for colossal scale rehearsal. Temperature is that the necessary factor to be taken into attention so as to save of thermo sensitive constituent of kwath drugs. The particle capacity of raw drugs also subsidizes to protect the standard of kwath. Duration of backing also has got to plan to get maximum active principles in processed kwath. These are the varied factors that crave to reform so as to urge standardized kwath. So, there's a crucial got to fix a couple of norms to get optimum standard of kwath kalpana. This paper will confer the varied factors poignant the standard of kwath and therefore the demand for standardization.

Standards for kwatha preparation

Pharmaceutical determinant is necessary to be disciplined an Approach such as: Vessel, low or high temperature, proportion of water, particle size and shape of crude drug, toleration of heating, and bunch of prakshepa dravyas. Vessel well-worn to used should be non-reactive to the drugs. Earthen pots as cited in classics are practically problematic to handle, so it can be reintegrated with stainless steel vessel with narrow opening which can save active phytoconstituents up to some extent. Dissimilar quota of water (2, 12 and 16) allude to in classic confide in on the resistance as well as on allocation of the drug used, for example, 8 times for comfy herbs (herbs leaves and flowers are used), 8 times for medium stiffness herbs (includes comfy barks of plants, roots and plants, comfy roots, tubers, and medium tubers), while 20 times for too thicker plants (dense barks of trees, root bark of trees and creeper). Acharya Yadavji has an inform that the ratio of water may be cinched on the background of the quantity of drug taken. However, extremely of the times, it is unyielding to judge the consistency of drugs, especially when the contents are poly herbal. Hence, a becoming known longing is necessary for qualitative and quantitative study to standardized quantum of heat and peak time perpetuation.

Particle size attrition is different important factor for kwatha. Deficient the size of particles, soaring will be the surface area which after all encourages phytoconstituents to enter in the water and vice versa. Particle size determination with the persistent study of kwatha kalpana on discrete particle size will help to conjunction the authoritative parameters. The concentration of kwatha less or more effectively depends on its therapeutic valuation and patients' digestive capacity, so the lacking of boiling should be standardized. Qualitative and quantitative valuation of phytoconstituents by physicochemical and chromatographic studies by governing above all variables is the necessary of the 1 to 2 hours to targeted consistency in pharmaceutical preparing of kwatha [9].

Kalmegha

Andrographis paniculata (Burm.) wall. Ex Nees (*Acanthaceae*)

Other names: Kalmegh (Beng.); Chuanxinline (Chin.); King of Bitters (Eng.); Kariyatu (Guj.); Mahatita (Hind.); Senshinren (Jpn.); Nelsveppu (Kan.); Nslsvepu (Mal.); Oil Kiryata (Mar.); Bhuinimba (Ori.); Bhuinimba (Sansk.); Nilavembu (Tam.); Neelsveemu (Tel.).

Kalamegha is bitter in taste. It is usna virya and alleviates kaphapitta. Its vipaka is katu. Kalamegha is light and unctuous. It is believed to principally act on the rakta dhatu which according to the basic physiological principals of ayurveda, is intricately related to liver metabolism.

Kalmegha is widely used as a remedy for enlargement of liver and spleen. In jaundice 2.5 to 5 grams of its dried powder or 5 to 20 ml of its juice is given. A mixture containing two parts of powder of kalamegha and one part of powder of black pepper is used in hepatomegaly, chronic fever and generalized edema.

Hepatoprotective activity: Effect Of the aqueous extract of *A. paniculata* (Each 5 ml containing 1 ml of kalmegh I.P. 1996 at a dose of) 3.75 ml/kg, p.p., on the biliary flow, liver weight and hexobarbitone sleep time has been investigated and compared with that of phenobarbitone (75 mg/kg i.p.). The extract was found to increase biliary flow and liver weight in rats and decrease the duration of Hexobarbitone induced sleep in mice. Administration of single dose of the aqueous extract of *A. paniculata* leaves (500 mg/kg, p.o.) 4 h before intoxicating has rats with CCL_4 (5 ml/kg, p.o.) has been shown to decrease CCL_4 induced hepatic microsomal lipid peroxidation. However, long term administration (15 consecutive days) of the extract or the andrographolide did not decrease CCL_4 induced hepatic microsomal lipid peroxidation. Further the aqueous extract (500 mg/kg or 1 g/kg, p.o.) or andrographolide (5 mg/kg or 10 mg/kg, p.o.) has been found to characteristically inhibit hepatic microsomal aniline hydroxylase, N-demethylase and O-demethylase when administered in single dose. Repeated administration of these test substance for 7-30 consecutive days, on the other hand, produces induction of all the three enzymes. This hepatotoxicity is thought to be mediated through free radical damage. The protective effect of *A. paniculata* is thought to be due, in part; to reactivation of superoxide dismutase which in turn counteracts per oxidative damage and *A. paniculata* may also cause induction of hepatic drug metabolizing systems which detoxify toxins (Figure 1).

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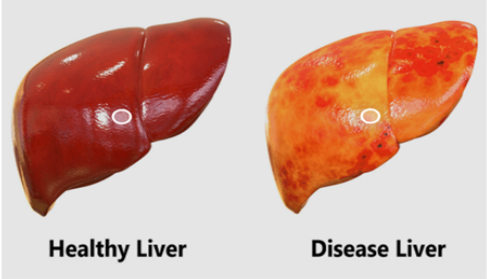

Figure 1: Healthy liver and fatty liver.

Pharmacokinetics: Oral doses of radio-labeled andrographolide given to mice were rapidly absorbed and distributed to organs, especially gall bladder, kidney, ovary and lungs. Andrographolide levels appeared to be low in spleen, heart and brain approximately 90 percent after 48 h. At 48 h, radio-labeled andrographolide only accounted for approximately 11 per cent of urine and liver fractions, the remainder consisting of metabolites.

Clinical trials: As I think an about clinical trials followed and do or get observed results. Administration of an aqueous decoction (4 × 21 ml/day) (equivalent to 48 g of the crude drug per day) of *A. paniculata* for 18 d to 22 patients with infective hepatitis has been reported to provide symptomatic relief to the patients. Decoction of

A. paniculata 60 ml per day (equivalent to 48 g of crude drugs) in three divided doses for 24 ± 6 d in human clinical trials (66 patients with hepatocellular jaundice) revealed that yellow color of the conjunctiva improved 100 percent, tender hepatic enlargement decreased in 94 percent within 20 d of treatment. Loss of appetite in 100 percent was improved after 4-6 days. Several tests for biochemical markers such as serum bilirubin, alkaline phosphates and serum transferase were highly significant after the treatment.

In another clinical trial herbal mixture of *A. paniculata* and *Emblica officinalis* was administered to patients with hepatitis B ± and post-hepatitis syndrome. The herbal mixture demonstrated efficacy in reducing clinical symptoms, improving liver functions and albumin.

Dosage: 2-3 kg of the dried crude drug. Fresh herb is used in doses of 35-75 g. Kalmegha liquid extract 0.8 to 1.0 ml. Gastric discomfort, vomiting and loss of appetite may be caused by large doses (orally) of the drug. Injection of the crude drug extract may lead to anaphylactic shock.

Toxicology: No toxic effect was observed after administration of a decoction of *A. paniculata* leaves to rabbits. The LD_{50} value of the andrographolide and their derivatives is 16.6 g/kg/p.o. The dried standardized extract of *A. paniculata* did not produce any sub-chronic testicular toxicity in male rats. The extract was evaluated in male sprague dawley rats for 64 d. No testicular toxicity was found with the treatment of 10, 400 and 1000 mg/kg during 64 d evaluated by reproductive organ weight, testicular histology, ultra-structural analysis of Leydig cells and testosterone levels after 64 d of treatment [10].

Kutaki

Picrrorrhiza kurrooa Royle ex Benth, *Scrophulariaceae*

Other names: Kutki, kuru (Beng. and Hind); kadu (Guj.); Katukhurohani (Mal.); Kutaki (Mar.); Katuka (Sansk.); Katukurogani (Tam.); Katukarogani (Tel.).

Decoction of kutki is given with honey or its powder is given with sugar for treating jaundice. There is a documented record suggesting that in ascites, consuming a decoction of kutakithrice or more daily produces strong diuresis which reduces the amount of accumulated fluid. It has also been reported to be very effective in malarial fever. It is very effective in liver disorder. An ayurvedic formulation called arogyavardhinivati, which is now being used as a hepatoprotective drug even by practitioners of modern medicine, contain 50 per cent of kutaki.

Hepatoprotective activity: In D-galactosamine induced hepatitis in rats, a significant increase of lipid peroxidation and a decrease in liver antioxidant enzyme levels were observed. The antioxidant effect of *P. kurrooa* (roots and rhizomes) ethanol extract has been attributed to the increase of the activities of free radical scavenging enzymes. Administration of ethanolic extract (100 mg/kg p.o. × 7 days) had marked effect on lipid peroxidation and superoxide dismutase activity in liver and brain of albino rats in which hepatotoxicity was induced by carbon tetrachloride.

- Hydrocholeretic effect in rats and dogs.
- Anti-necrotic effect in carbon tetrachloride-induced damage in rats and rabbits.
- Reduces fatty infiltration and lipid deposits in galactosamine-induced liver damage.
- Reduces paracetamol induced hepatic damage.
- Reverses the loss in body weight in alcohol treated rats.
- Improves food intake in carbon tetrachloride-induced liver damage.
- Enhances the levels of DNA, RNA, protein and cholesterol poses partial hepatectomy; the mitotic index was also increased.
- Scavenging of superoxide anions and inhibitions of lipid peroxidation.
- Antiviral effect own vaccine viruses.

Clinical trial: Effect of katurohini (*P. kurrooa*) in the treatment of viral hepatitis-a double blind study with placebo control Showed total clearance of bile salts, bile pigments, serum bilirubin from the blood when patients were treated with powered drug 400 mg dose thrice a daily. In another study decoction of *P. kurrooa* given orally thrice a day for four weeks to 30 patients of infective hepatitis, the investigators reported significant improvement with respect to serum bilirubin, serum alkaline phosphatase, SGOT, SGPT, serum total protein, serum albumin in drug treated group of patients with no side or toxic effects during clinical study. In an uncontrolled clinical study on 9 patients of infective hepatitis with jaundice, a decoction of *P. kurrooa* was reported to have led to fall in serum bilirubin levels towards normal range and quicker clinical recovery of patients. No untoward effect was observed except diarrhea and griping pain. None of the patients available for follow-up study up to four years showed any relapse of jaundice or any other known post-hepatitis complications. In the same study, two compound Ayurvedic preparations *viz* arogyavardhini and phalatrikadi kvatha (decoction) both having *P. kurrooa* as the main ingredient (along with *Terminalia chebula*, *T. bellerica*, *Emblica officinalis*, *Commiphora wightii* (syn. C. mukul), *Plumbago zeylanica*, minerals and bhasmas) was evaluated in a pilot clinical trial on 24 patients of viral hepatitis. Administered orally in a dose of 400 mg thrice a day for 2 weeks, the drug led to a significant degree of improvement in clinical symptoms and signs including appetite and liver size and significant lowering of serum transaminases (SGOT, SGPT) and serum bilirubin in the first week of treatment. There were no major side effects and the extract was well tolerated. These results were confirmed in a double-blind clinical trial on 38 patients during an epidemic of acute viral hepatitis in Mumbai, when arogyavardhini was administered orally for 12 d (In a dose of 650 mg thrice a day). The drug markedly reduced tenderness and hepatomegaly as also the total serum bilirubin and the SGPT levels in the first week. No significant side effects were observed. The hepatoprotective effect of arogyavardhini has been reviewed [11].

Another compound herbal preparation which in addition to *P. kurrooa*

contained *Commiphora wightii*, *Myrobalans* (Triphala), *Boerhaavia diffusa* and *Strychnos nux-vomica* was evaluated in a clinical trial on 50 patients of infective hepatitis. This open trial indicated alleviation of the symptoms within four days, whereas jaundice was reported to have disappeared in 80 per cent of the patients within seven days. The drug restored the liver functions to normal as assessed by a fall of serum bilirubin as well as SGOT and SGPT levels. No side effect was observed during therapy. Punarnavadi kvatha yet another compound preparation containing *P. kurrooa* along with *Boerhaavia diffusa*, *Azadirachta indica*, *Tinospora cordifolia*, *Terminalia chebula*, *Berberis aristata*. *Trichosanthes dioica* and *Zingiber officinale* was also evaluated for its efficacy in the management of viral hepatitis in patients in a pilot trial.

Toxicology: In clinical trials with the drug, no any significant side effects have been observed. However, kutkin free extracts are not only devoid of any hepatoprotective activity but may aggravate galactosamine toxicity and therefore should be avoided in the treatment of liver disorder.

Dosage: 2-4 g of dried drug

DISCUSSION

The existing clinical advance toward for the treatment of hepatic disease have been through antiviral, immune-stimulant, cyto-protective, suppression of fibro-genesis, and to sum up symptomatic therapy to restriction symptoms such as vomiting, itching, etc; and to give with nutritional supplements. The drugs presently available for therapy include antiviral and immune-stimulants such as nucleic acid analogs and interferon besides supportive drugs.

In India, adequate working has been done on screening of medicinal plants for hepatoprotective energies and activities are interesting leads available that need to be given chase to logical ends. Alcoholic hepatitis, medicinal plants can often provide effective and safe use remedies. Some of the classical immaculate ingredient ayurvedic formulations such as arogyavardhini, punarnavadikvatha, haridradighrtam, dhatryavleha, navayasa cuma, etc. need to be seriously concentrated evaluated for the accordance of claims made in the ayurvedic history.

Poor of data on well think out clinical trials on medicinal plant based experimentally passed hepatoprotective products is the major cause of minor acceptance of such medicinal plant products. If perfectly designed and well thought of plans are employed for lead clinical trials on duty systematize herbal products, safe, affordable, and effective drugs for the different liver disorders can be produced.

Long-established herbal remedies have been and are being used everywhere the world by patients suffering from liver disorders. Research efforts reveal that using a hepatoprotective plant in the whole form or as its complicated extract may offer many advantages due to the presence of the multifarious bioactive components. Of considerable benefit would be well researched herbal products adjunct on traditional preparation methodology and make uniform to contain effective levels of the most important active constituents.

This monograph attempts to examine the salient features of liver biology, various liver disorder, their prevalence, etiopathogenesis, and management of liver disease both from the modern scientific viewpoint as well as from ayurvedic concepts. As per Ayurveda, abnormal liver functions may be due to panduroga (anemia), Kamal (Jaundice), rakta pitta (Bleeding problems), sotharoga (anasarca), udararoga (chronic abdomen problem) and graham yoga (a special category of disease affecting those who are immunologically weak such as children and pregnant mothers). Though as per Ayurveda, there are 12 graharogas distinct liver damage may be seen in a few particular conditions *viz* much manlike which is compared with Indian childhood cirrhosis a disorder caused by serving malnutrition. Revati and suskarevati are idiopathic symptom complexes caused by serve malnutrition. Revati and suskarevati are idiopathic symptom complexes caused by irreparable liver damage or due to metabolic errors or due to severe immunodeficiency.

Hepatitis or inflammation of the liver denotes an organ-specific designation for a clinical entity of diverse etiology and pathogenesis. It has been recognized as a worldwide cause of morbidity and mortality in all age groups. Both sporadic and epidemic forms have been described from different regions of the world. There are accounts of epidemics of jaundice in western literature that date backs to 751 ADS by Pope Zacharias. Viruses belonging to at least six different families may be responsible for most hepatitis in humans. Advances in molecular biology have resulted in the identification and sequence analysis of two viruses acquired by the fecal-oral route of transmission (Hepatitis A virus, HAV, and hepatitis E virus HEV) and two viruses acquired parenterally (hepatitis C virus, HCV and hepatitis D virus, HDV).

Drugs and chemicals are also a causative factor of hepatitis. The adaptation of the liver to drugs and chemicals depends on up on interplay among absorption, environmental factors, and genetics. The liver injury occurs by direct toxic damage from drugs and their metabolites or by immune allergic reactions. Conditions like malnutrition, fasting, pregnancy, alcoholism, etc. can also contribute to liver injury. Fatty degeneration, hepatitis, and cirrhosis are major pathological changes seen in patients with alcoholic liver disease. Extra-hepatic biliary obstructive due to pancreatitis can also be a cause of liver disorders [12].

Most studied hepatoprotective plants such as *Andrographis Panniculata*, *Boerhavia diffusa*, *Cichorium intybus*, *Curcuma longa*, *Eclipta Alba*, *Glycyrrhiza glabra*, *Phyllanthus amarus*, *Picrrorrhiza kurroa*, *Plumbago zeylanica*, *Silybum marianum*, *Swertia chirata*, and *Tinospora cardifolia*, which have been traditionally used and also scientifically evaluated are a potential future source of drugs for a wide spectrum of the hepatic disorder.

Picrorhiza kurrooa (Katuka) removes Kapha and Pitta i.e. kaphapittahara (removes obstruction of the bile duct) and is yakrdutterjaka (liver-stimulatory) as per Ayurveda. One of the classical Ayurvedic formulations is arogyavardhin I which contains *Picrrorrhiza kurroa* as the major ingredient (50 percent) and this formulation is very well used for liver disorders.

CONCLUSION

There are nearly 200 Plants involved in various polyhedral formulations both from classical ayurvedic texts, unani classical folk remedies as well as commercially available proprietary formulations for various kinds of liver disorders. We need to understand the role of each of these plants and rationality of their use in such formulations for hepatic disorders. Multi-ingredient formulations are difficult to standardize because of the phytochemical complexity of each of the plant involved. In the absence of arability of effective modern medicines which can treat and reverser the hepatic damage in several liver disorders, this field of exploring the hepatoprotective potential of medicinal plants would be highly rewarding for establishing the efficacy, safety and quality of medicinal plant products as well as for the discovery of new chemical entities with strong hepatoprotecting Potential.

REFERENCES

[1] Panda AK, Bhuyan GC, Rao MM. *J. Tradit. Med. Clin. Natur*. **2017**; 6(1): 53-57.

[2] Kumar N, Singh AK, Ghildiyal S. *J. Pharmacol. Therap*. **2015**; 1(1): 1005.

[3] ICMR. *Med. Plant. Unit.* **2008**; 56: 13-15.

[4] Liver disease. *Patien. Care.* **2021**.

[5] Biggers A. *Health*. **2021.**

[6] ICMR. *Med. Plant. Unit.* **2008;** 2: 31-36.

[7] Medications and the Liver. *ACG*. ***2021.***

[8] ICMR. *Med. Plant. Unit.* **2008;** 3: 5-6.

[9] Meena V, Bhushan S, Chaudhary AK, Kalpana K. *Asian. J. Pharm*. **2017**; 11 (4).

[10] ICMR. *Med. Plant. Unit.* **2008;** 4: 135-145.

[11] ICMR. *Med. Plant. Unit.* **2008;** 7: 245-260.

[12] ICMR. *Med. Plant. Unit.* **2008;** 8: 354-365.