Evaluation of Hepatoprotective Activity of Herbal Formulation

1. INTRODUCTION

1.1 Herbal drugs

For thousands of years mankind has known about the benefit of drugs from nature. The drugs used by ancient civilizations were extracts of plants or animal products, with a few inorganic salts. In the main, plants in medical use have been estimated very highly, e.g. in India where the Ayurveda gave access to a broad variety of medicines from plants reported since 1000 BC. The earliest prescriptions in Chinese medicine based on natural products date back to about 500 BC and some of the classical Chinese formulae handed down in the years between 25 and 220 BC are still in use.

Nature always stands as a golden mark to exemplify the outstanding phenomenon of symbiosis. The biotic and abiotic elements of nature are all interdependent. The plants are indispensable to man for his life. The three important necessities of life –food, clothing and shelter and a host of other useful products supplied to him by the plant kingdom. Nature has provided a complete store-house of remedies to cure all ailments of mankind. The knowledge of drugs has accumulated over thousands of years as a result of man’s inquisitive nature so that today we possess many effective means of ensuring health care.

Nature’s beauty in terms of health care is appreciated by developing various systems of traditional system (Ethnomedicine). Ethnomedicine may be defined broadly as the use of plants by human as medicine, but this use could be called ethnobotanic medicine. There is growing focus on the importance of medicinal plants in the traditional health care system (viz. Ayurveda, Unani, Homeopathy, Yoga) in solving health care problems. Because of this awareness plant materials and herbal remedies derived from them represent substantial portion of the global market. The demand for herbal products is growing exponentially throughout the world and major pharmaceutical companies are currently conducting expensive research on plant materials for their potential medicinal value.

1.2 Pharmacological Screening

The Liver, which is the largest gland in the body, plays a central role in metabolic homeostasis, it serves as the primary regulatory site for energy metabolism, taking up and
processing ingested nutrient for controlled distribution to extra hepatic tissues. In addition liver synthesizes essential proteins, enzymes, and co-factor required for digestion and normal bodily function. Diverse homeostatic mechanisms are affected if liver function is impaired, with potentially serious consequences for the individual concerned.

Drug induced liver injury is an unresolved problem and often limits drug therapy in clinical practice. Liver injury may follow the inhalation, ingestion or parenteral administration of a number of chemical and pharmacological agents. Drug induced liver diseases can mimic all forms of acute and chronic hepatobiliary diseases.

However, the predominated clinical presentation resemble acute icteric hepatitis or cholestatic liver disease. Chronic hepatitis can present itself under various forms, from the very active and progressive disease with multi-organ involvement, rapid onset of cirrhosis and evolution in liver insufficiency to an almost asymptomatic disorder. This disease will be discussed with regard to clinical and serological parameters, histological aspects and management.

1.3 Need for the Study

The many species of medicinal plant have been shown to produce beneficial effects in the treatment of various diseases. Historically, plants have been used as folk medicines against various types of diseases. Even today crude extract of medicinal plants are used widely by country to cure human ailments in many countries.

The modern medicine does not have suitable answer for many conditions such as liver disorders, asthma, cardiovascular disorder etc.

The survey of literature reveals that the bark root, leaves, fruits of plant *Mangifera indica* L., *Ricinus communis* L. & *Caesalpinia bonduc* L. are used as astringent, laxative, diuretic, tonic, ulcers, in infectious diseases & efficacious in liver disorders.

The extract of the leaves of *Mangifera indica* L., *Ricinus communis* L. & *Caesalpinia bonduc* L. has shown property as an antioxidant. The leaves contain amino acid, ascorbic acid, carotene, folic acid, vitamin D, flavonoids & mineral constituents. Thus
flavonoids, ascorbic acid, vitamins play vital role in hepatoprotective activity against carbon
tetrachlorides induced hepatotoxicity.\textsuperscript{7,8}.

\textbf{1.4 PLANTS PROFILES:}

\textbf{I. \textit{CAESALPINIA BONDUC} LINN.}

Synonym - Fever nut

Botanical Name - \textit{Caesalpinia bonduc} \textit{L.}

Family - Caesalpiniaceae.

It is found throughout the hotter parts of India, Burma and Sri Lanka, particularly on waste
ground and particularly along the sea coast, and up to 2,500 feet on the hill.

The plant is known by various names in different languages as under\textsuperscript{9}.

\textbf{Vernacular Name :}

\begin{itemize}
  \item Sanskrit : Putikaranja
  \item English : Fever nut
  \item Hindi : Karanju
  \item Kannada : Gajagakayi
  \item Marathi : Sagargota
  \item Tamil : Kazhichikay
\end{itemize}

\textbf{Morphology of \textit{Caesalpinia bonduc} \textit{L.}}

\textbf{Seed} - antiperiodic, antirheumatic. Roasted and used as an antidiabetic preparation.

\textbf{Leaf, bark and seed} - febrifuge. Leaf and bark - emmenagogue, anthelmintic.

\textbf{Root} - diuretic, anticalculous. The seeds contain an alkaloid caesalpinine; bitter principles such
as bonducin; saponins; fixed oil. The seed powder, dissolved in water, showed hypoglycaemic
activity in alloxanized hyperglycaemic rabbits. Aqueous extract of the seeds produced similar effects in rats. The powder forms a household remedy for treatment of diabetes in Nicobar Islands. In Kangra, Himachal Pradesh, roots are used in intermittent fevers and diabetes. In homoeopathy, the plant is considered an excellent remedy for chronic fever.

II. MANGIFERA INDICA LINN.

Synonym  - Mango

Botanical Name - *Mangifera indica* Linn

Family  - Anacardiaceae

The tree is native from tropical Asia. It is a large evergreen tree, long living, 10-45 m high with a strong trunk and heavy crown. Mango is extensively cultivated in south India, north India, and West Bengal & Jammu Kashmir for its foliage yield. The plant is known by various names in different languages as follows:

**Vernacular Name:**

- Sanskrit : Aam, Ambaj.
- Hindi : Aam.
- Marathi : Aanba.
- English : Mango.
- Tamil : Manga.

*Mangifera indica* L. is a large evergreen tree. The leaves contain a pentacyclic triterpene alcohol, indicol, besides taraxone, taraxerol, friedelin, lupeol and beta-sitosterol. Leaves contain several sugars, free malic and citric acids and amino acids. Some esters of benzophenone C-glucosides and kinic and shikmic acids have also been reported. Mangiferin is present predominantly in the leaves and twigs.

Ripe mango contains sugars, citric acid, ascorbic acid, carotenoids as betacarotene. The fruit gave phenolic compounds (m-digallic acid, gallotannin, phloroglucinol, protocatechuic acid;
flavonoids, kaempferol and myricetin. The seed kernel contains alpha-and beta-amyrians, gallotannin, glucogallin and several sterols$^9$.

**III. RICINUS COMMUNIS LINN.**

**Synonym** - Castor Leaves

**Botanical Name** - *Ricinus communis* L.

**Family** - Euphorbiaceae

The plant is known by various name in different languages as follows:

**Vernacular Name**:

- **Sanskrit**: Bedanjeer, Arand.
- **Hindi**: Eranda
- **Marathi**: Erandi
- **English**: Castor seed.
- **Tamil**: Ammanakku.

*Ricinus communis* L. is a large evergreen tree. Cultivated chiefly in Andhra Pradesh, Maharashtra, Karnataka, and Orissa.

Oil from seeds and young leaf—purgative. Oil is used in dermatosis and eczema. Leaves—used as poultice to extract the worm. Root—a decoction is administered for lumbago and allied complaints. Bark—purgative. *The Ayurvedic Pharmacopoeia of India* recommends the decoction of the dried, mature root in rheumatism, pain in the urinary bladder, lumbago, diseases of the abdomen and inflammations; fresh leaf in helminthiasis, dysuria, arthritis, pain in the urinary bladder, dysuria, abscesses; dried seed powder in constipation, rheumatism, diseases of the liver and spleen, piles, lumbago, sciatica$^9$