

Hepatoprotective herbal medicine in Iranian traditional medicine (ITM)

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ABSTRACT

Medicinal plants have been traditionally used as natural medications with healing effects. Scientific assessment of historical documents could be valuable for finding new potential uses for these plants in modern medicine. The liver is a vital organ which plays a key role in metabolism and drug detoxification; if the detoxification functions of the liver are impaired, many disorders will result. Therefore, strengthening liver function with herbal medicines is a fundamental step to achieving or maintaining perfect liver health. Valuable information about medicinal plants and their protective effects on the liver mentioned in the works of Iranian scientists make valuable knowledge available for those who are interested. In the present study, we reviewed traditional books for mention of plants helpful in liver maintenance and the treatment of liver diseases. Any research or articles of modern medicine related to the efficacy of these plants in the gastro-intestinal tract were also collected from the Physician's Desk Reference (PDR), Google Scholar, and Pub-med. In this paper, we introduce 15 herbal plants used in ITM in order to present an overview of traditional knowledge regarding hepatoprotective plants. Data suggests that Iranian traditional herbs known to be beneficial to liver function could still be an interesting area of study. Therefore, the current work briefly shows the deep knowledge to be found in ITM regarding medicinal plants; however, more clinical trials are needed to prove the efficacy and safety of these herbs for humans.

Keywords: Avicenna, liver, plant

INTRODUCTION

The liver is one of the vital organs of the body and plays a key role in the metabolism of carbohydrates, proteins, and lipids. It aids in the maintenance, performance, and regulation of homeostasis of the body [1]. It also has a wide range of functions, including the storage of glycogen, vitamin A, B12, and D, the production of several coagulation factors, growth factors, hormones, and biochemical necessary for digestion, and the detoxification and elimination of drugs [2]. If the detoxification functions of the liver are impaired by hepatotoxin agents such as medicines and alcohol, malnutrition, anemia, infection [3] and aflatoxin[4], there will be many disorders in the body. Therefore, strengthening liver function is a fundamental step to achieving or maintaining perfect liver health[5].

Numerous studies have been done on liver-protective agents. In spite of great strides in modern medicine, there are scarcely any drugs that stimulate liver function, protect the liver from damage, or help the regeneration of hepatic cells [6].

At the present time, traditional medicine has been revived by the WHO recommendations for the development of native knowledge and the use of alternative national medicine [7].

The importance of the liver was also recognized in ITM. It is involved with almost all pathways to growth, conflict against disease, nutrient supply, and energy provision and reproduction [8]. Iranian scientists worked rationally based on observations and made a considerable number of discoveries in various fields involving the liver. Their ancient contributions have produced an insight into the most celebrated hepatoprotective plants. The valuable information about medicinal plants and their effects mentioned in the works of Avicenna, Rhazes, Jorjani and Aghilikhorasani are treasures of knowledge.

In this paper, we present some herbal plants used in Iranian traditional medicine which have protective effects on the liver.

MATERIALS AND METHODS

In the present study, we reviewed "Al-Hawi" (The Liber Continens, written by Rhazes, a well-known Iranian physician, alchemist, and philosopher (9th A.D)) [9], "Al-Qanoon fi al-Tibb" (Canon of Medicine, an important medical textbook written by [10], the greatest Iranian physician and philosopher(11th A.D)) [11], and "Zakhireh Kharazmshahi" (Zakhireh-i Kharazmshahi, written by Sayed Ismail Jorjani, an outstanding Iranian physician (11th A.D)), "Makhzanoladvieh" (Makhzan-ol-advieh, written by Aghilikhorasani was the prominent scholar who significantly influenced the development of medical science (18th A.D))[12], for mention of plants which are helpful in liver maintenance and the treatment of its diseases.

Any research or articles of modern medicine related to the efficacy of these plants in the gastro-intestinal tract were also collected from the Physician's Desk Reference (PDR), Google Scholar, and Pub-med.

RESULTS AND DISCUSSION

Hepatocellular injuries caused by hepatotoxins such as toxic chemical agents, extreme alcohol consumption, and microbes have been well-studied. Hepatotoxins are the most common cause of liver disease, so the protection of hepatocytes is an essential subject in the treatment of liver diseases; hepatoprotective plants play a significant role in this purpose [13, 14].

In Iranian Traditional Medicine (ITM), plants are extensively used to cure liver disorders. The valuable data about medicinal plants and their hepatoprotective effects mentioned in the works of Iranian scientists provides valuable knowledge for those who are interested.

In this paper, we introduce 15 plants described in ITM that are known to be effective in liver tonics [8, 15, 16].

Modern scientific studies of these herbs have shown that nine of them (*Myristica fragrans* Houtt (Nutmeg), *Nardostachys jatamansi* DC, *Myristica fragrans* Houtt (Mace), *Artemisia absinthium* Linn., *Cinnamomum cassia* Blume, *Acorus calamus* Linn., *Commiphora opobalsamum* Linn., *Pistacialentiscus* Linn., and *Cuscutare flexa* Roxb) are hepatoprotective.

Nutmeg and Mace are two parts of the *Myristica fragrans* plant, each of which is widely used in ITM in the field of gastroenterology for the treatment of digestive problems, liver problems, jaundice, and hepatitis [8, 17]. To investigate the hepatoprotective effects of *Myristica fragrans* (nutmeg and mace), mice were given the aqueous extract of *Myristica fragrans*. Nutmeg exhibited significant hepatoprotective effects, and mace was effective in modulating hepatic xenobiotic metabolizing enzymes in the livers of mouse pups. Moreover, active principles from mace influenced the hepatic detoxification systems in adult mice [10, 18].

According to medieval Persian literature, *Pistacia lentiscus* Linn. gives instant relief from gastric and hepatic inflammations and increases appetite; *Commiphora opobalsamum* Linn. is useful in treating dyspepsia and vascular and bile duct obstruction [8, 15, 16]. To investigate the hepatoprotective effects of the two above-mentioned plants, hepatotoxicity was induced in rats with carbon tetrachloride. Extract of *Commiphora opobalsamum* and *Pistacia lentiscus* have been shown to possess significant protective effects by lowering serum transaminase levels, alkaline phosphatase, and bilirubin [19, 20].

Persian physicians believed *Nardostachys jatamansi* DC was useful in treating hepatic and bile duct obstructions and jaundice [8, 15, 16]. One study indicated that a 50% ethanolic extract of the rhizomes of *N. jatamansi* lowered elevated levels of serum aminotransferases and alkaline phosphatase and also resulted in an increase survival rate in rats intoxicated with LD90 dose of the hepatotoxic drug [21].

In medical texts of medieval Persia, physicians recorded that *Acorus calamus* Linn was useful in treating bile canaliculi and hepatic duct obstructions [8, 16]. In current studies, this plant is believed to be hepatoprotective and nephroprotective [22, 23]. The protective effect of a methanolic extract of *Acorus calamus* against alcohol-induced hepatotoxicity and oxidative stress has been studied in rats. Observations were supplemented by a histopathological examination of liver sections. Results showed that the administration of *Acorus calamus* ameliorates the antioxidant status and also protects against the toxic effects of ethanol in rats [23]. This plant was reported in ITM literature to have diuretic effects [17]; due to its hepatoprotective and nephroprotective effects seen in new research, this plant can be studied as a potentially good diuretic drug for hepatorenal disorders.

Persian physicians prescribed *Artemisia absinthium* Linn. as a beneficial plant to treat hepatic and bile duct obstructions and correct intra-hepatic cholestatic jaundice [8]. Some studies have shown the hepatoprotective effects of the aqueous-methanolic extract of *Artemisia absinthium* (compositae) on carbon tetrachloride (4)-induced liver injury in mice [24].

Persian physicians also recommended the administration of *Cinnamomum cassia* Blume as useful for hepatic jaundice [8, 15, 16]. The hepatoprotective effects of the extract of the medicinal plant *Cinnamomum cassia* against diethylnitrosamine-induced liver injury in rats was investigated [25].

An extensive survey of the literature revealed that the herb *Cuscutareflexa* is medicinally important. In ITM, *Cuscutareflexa* was useful in tonics for the stomach and liver [8, 16] and in treating hepatic and gastric obstructions [8], jaundice [8, 16], and hiccoughs [8]. The evaluation of the hepatoprotective activity of extracts of *Cuscutareflexa* on Rifampicin- (RIF) and Isoniazid (INH)-induced hepatotoxicity in rats showed a significant decrease in serum parameters of the extract by biochemical measurements: Serum alanine aminotransferase, aspartate aminotransferase, and alkaline phosphatase activities, total bilirubin and could be very useful in managing hepatoprotection on INH- and RIF-induced hepatotoxicity [26].

Other plants listed in Table 1 are considered very important in the field of gastroenterology and the treatment liver problems in ITM texts.

Rheum officinale Baill. is one of the most popular traditional medicinal herbs [27] that was widely used in Iranian herbal medicine in tonics for the liver [15, 16], as a carminative, and as an agent in the treatment of swellings [8], gastrointestinal indigestion, ascites, obstructions of the liver, spleen, and intestines, jaundice, and hemorrhoids [17]. *Crocus sativus* Linn. in ITM was considered useful in tonics for the stomach and liver [8, 15, 16], as a deobstruent of the liver and stomach [16], and as a diuretic [17]. It is also used in other traditional medicine systems; e.g., in Chinese medicine it is used for menorrhagia, amenorrhoea, etc., and in Indian medicine, it is used to treat bronchitis, sore throat, headache, vomiting, and fever [27].

Cuminum cyminum Linn. seeds are an ancient spice with a strong aromatic smell. This spice is widely used as a condiment and flavoring in many eastern dishes. Not only is cumin a spice, but it also has great medicinal value and is widely used in ITM to treat flatulence, digestive disorders, and obstructions of the hepatic and bile ducts. It is also valuable as a liver tonic [16].

Elettaria cardamomum Linn. is a cholagogue and has virustatic properties. In animal experiments, this essential oil caused an increase in bile secretion and a reduction in gastric juice production [27]. Cardamom is used in ITM in

tonics for the liver and stomach [8] and for digestive complaints [17]. In Chinese medicine, cardamom is used to treat stomachache, nausea, vomiting, and flatulence; in Indian medicine, it is used to treat disorders of the urinary tract [27].

Cinnamomum zeylanicum Blume. plays a significant role in plant-based traditional medicine systems in China, India, and other Asian countries. In Iran, cinnamon has been used in traditional medicine for the treatment of obstructions of the liver [8, 15], dropsy [8], and halitosis, and it is used in tonics for the liver and stomach [8].

Pistaciavera Linn. not only is a nut, but also has great medicinal value. It has sedative and tonic effects[28], and in ITM it was used in tonics for the liver and stomach [16]. It was also found to be useful in treating diseases of the stomach and spleen[8], obstructions of the liver, bile duct, and stomach [8, 15, 16], nausea, vomiting [8], and jaundice [17].

Modern scientific studies of the herbs discussed above have shown that six of them (*Rheum officinale* Baill., *Cuminum cyminum* Linn., *Pistaciavera* Linn., *Elettaria cardamomum* Linn., *Crocus sativus* Linn., and *Cinnamomum zeylanicum* Blume.) have anti-oxidant and/or anti-inflammatory effects [29-39]. Since the antioxidant and anti-inflammatory effects are related to hepatoprotective effects [5, 40], it seems that these six plants may be useful in treating problems of the liver. Their antioxidant and anti-inflammatory effects have been demonstrated by various studies in recent years, however further research is needed to validate this claim.

CONCLUSION

Data suggests that Iranian traditional herbs known to be beneficial to liver function could still be an interesting subject of study. Therefore, the current work briefly shows the deep knowledge of medicinal plants that is found in ITM. However, more studies are needed to evaluate the safety and efficacy of these plants.

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