INTRODUCTION

Liver plays an important role in the digestive process and helps to convert nutrients into forms that can be used by the body. It also participates in removing the toxins from blood and maintains the normal composition of the blood. Hepatotoxicity is a common ailment resulting in severe metabolic disorders and may cause to even mortality [1]. Hepatic damage or chronic hepatic diseases is one of the commonly occurring health problems worldwide, with liver cirrhosis and drug-induced liver injury accounting for the leading cause of death amongst the western and developing countries populations like India [2]. Liver damage due to ingestion or inhalation of hepatotoxin such as drugs is increasing worldwide, and conventional drugs used in the management of drug-induced liver damage are mostly inadequate and have serious adverse effects. It is, therefore, necessary to explore the herbal options in the management of drug-induced liver damage to replace currently used drugs of low efficacy and safety. It is a major health issue that challenges not only health care professionals but also the pharmaceutical industry and drug regulatory agencies [3]. Drug-induced liver injury is the most commonly cited reason for withdrawal of already approved drugs from the market. According to the United States Acute Liver Failure Study Group, drug-induced liver injury accounts for more than 50% of acute liver failure. Hepatotoxicity caused by overdose of paracetamol and idiosyncratic liver injury triggered by other drugs (Amoxicillin + Clavulanate), Flucloxacillin, Erythromycin, Ciprofloxacin, anti-tubercular drugs (Isoniazid, Rifampicin, Pyrazinamide, anti-retroviral drugs (e.g. Ritonavir) accounting for about 13% [4]. Drug-induced liver toxicity accounts for approximately half of the cases of acute
liver failure and mimics all forms of acute and chronic liver disease [5]. The reported incidence of anti-tuberculosis drugs induced hepatotoxicity indicates that the developing countries are having difficulties in prevention and management of tuberculosis drugs induced hepatotoxicity.

No effective measures are available for the treatment of the liver diseases. The different medical, surgical and therapeutic methods used at present are inadequate with generally poor results. The treatments require prolonged therapy and if very strong drugs are given for long period extending several months, these may overburden the diseased liver and produce harmful effects. Paradoxically some of the modern drugs, which are given to treat liver diseases, may themselves cause liver damage. For example choleostatic jaundice has been identified in man as a result of one month’s immunosuppression and azathioprine. Interferon and virazole causes elevation of serum hepatic enzymes.

Adverse effects of prolonged use of drugs are well documented. It is therefore, imperative to search alternative drugs for the treatment of liver diseases. Natural resources such as plants are always considered and used in the search for new molecules to be used as drugs. Numerous medicinal plants and their formulations are used for liver disorder in ethnomedical practice as well as traditional system of medicine in India [6]. Plant-based therapeutic agents like silymarin from Silybum marianum (milk thistle) are used worldwide as hepatoprotective [7]. Silymarin is a flavonolignan that has been introduced as a hepatoprotective agent. Silymarin is extracted from the seeds and fruits of Silybum marianum which is a mixture of three structural components (viz. Silibinin, Silydianine and Silychristine). In India, about 40 polyherbal commercial formulations reputed to have hepatoprotective action
are being used. It has been identified that 160 phytoconstituents from 101 plants have hepatoprotective activity. Liver protective herbal drugs contain a variety of chemical constituents like phenols, coumarins, lignans, essential oil, monoterpenes, carotenoids, glycosides, flavonoids, organic acids, lipids, alkaloids and xanthines. Plant extracts of many crude drugs are also used for the treatment of liver disorders. Extracts of about 25 plants have been reported to cure liver disorders [8]. In spite of tremendous strides in modern medicine, there are hardly any drugs that stimulate liver function, offer protection to the liver from damage or help regeneration of hepatic cell [9]. There are however, many drugs employed in traditional system of medicine for liver diseases [10]. In the absence of reliable liver protective drugs in allopathic medicines, herbs will play an important role in the management of various liver disorders most of which speed up the natural healing processes of the liver. Scientific evaluation of medicinal plants is important to the discovery of novel drugs and also helps to assess toxicity risks associated with the use of either herbal preparations or conventional drugs of plant origin. There is a growing interest in herbal remedies because of their effectiveness, minimal side effects in clinical experience and relatively low cost.

Therefore, studies with plant extracts are useful to know their efficacy and mechanism of action and safety. Natural remedies from medicinal plants are considered to be effective and safe alternative management of drug induced hepatotoxicity. In the Indian System of Medicine (ISM), the plants are classified in various groups on the basis of experience and ethnomedicinal uses. Hepatoprotective plants have an important place in the literature of ISM.
Many plants mentioned in the ISM, like *Andrographis paniculata*, *Berberis aristata*, and *Phyllanthus amarus* are used either alone or in combination as hepatoprotective.

The present study was undertaken to investigate the efficacy of *Adenanthera pavonina* and *Erythrina indica* used in the Indian traditional medicine for their hepatoprotective activity.
References


