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Paper review

PHYTO THERAPEUTIC IMPACT OF MEDICINAL PLANTS; A REVIEW

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ABSTRACT: Medicinal plants play a major role in the development of human cultures. Medicinal plants are a rich source of phytochemical compounds, which have proven therapeutic efficacy throughout the ages. The therapeutic efficacy is attributed to those secondary biologically active compounds. Plants have provided the human being with all his needs of food, drink, and clothing. In addition they are an important source for the treatment of many diseases being the basis of the science of alternative medicine, In recent times, the area cultivated for these medicinal plants has increased, and scientific research has tended to study the effectiveness of these plants in treating many diseases. Most plants have an effective effect as an antioxidant, anti-hyperlipidemia, hypoglycemic, antihypertensive as well as for cardiovascular diseases and strokes. The study aims to provide important data on the extent to which some medicinal plants are used in the treatment of various diseases.

Keywords: Medicinal plants, Traditional medicine, Antioxidant, Diabetes, Hyperlipidemia, Hypertension, Secondary metabolic.

INTRODUCTION

Natural products extracted from medicinal plants have been used to treat many diseases. Since the dawn of history, medicinal plants have been the first source of treatment due to their availability, ease of access, low cost and side effects compared to chemical drugs. According to a report by the World Health Organization, nearly 80% of the population of developing countries around the world use medicinal plants to treat their various diseases. Cultivation of medicinal plants helped provide an important source of biological compounds. And medicine in the modern era still relies, like alternative medicine, in relying on medicinal plants in treatment. Where, the plant works to produce secondary metabolites, which are phytochemical compounds that have a high ability not only to protect the plant, but also to protect humans and animals from pathogens. There are many phytochemical compounds such as phenols, polyphenols, alkaloids, saponins, terpenes, and flavonoids. These compounds have antioxidant, antiviral and antibacterial activity, antihypertensive and antidiabetic activity (Vivek-Ananth et al., 2023).

Currently, oxidative stress plays the major role in the development of wide range of disorders. Oxidative damage due to reactive oxygen species occurred due to impaired balance between the antioxidant molecules to neutralize and the production of ROS and RNS (Kalim et al., 2010). The molecules act as antioxidants reduce or prevent the oxidation of the substrate. Oxidation reactions lead to free radicals that start the chain reactions and can then induce many human diseases (Chatha et al., 2014). Antioxidants neutralize the free radicals leads to chains reactions and self-oxidized to prevent the chemical changes in biological molecules (Halliwell, 2005). Although, in routine free radical or ROS involved in the production of energy,

but these do not only cause oxidative damage to proteins, nucleic acids and lipids; also have an important role in the disruption of intracellular signaling and phagocytosis. Oxidative damage may cause a wide range of contagious diseases like diabetes, obesity, aging, cancer, cardiovascular diseases, joint disorders, and Alzheimer's disease (Bergamini et al., 2004; Afonso et al., 2007; Chatha et al., 2014).

ANTIOXIDANT ACTIVITIES OF PHYTOMOLECULES

Different enzymes include catalase, superoxide dismutase and glutathione peroxidase in our body acted as natural antioxidant defense to eliminate the free radicals (Dharani and Kalaivani, 2015). Catalase finally produces the water and oxygen molecules from superoxide produced during the metabolic reactions (Kefer et al., 2009). Phenolic compounds such as polyphenols, found in plants play a major role in pharmacological and many biological activities like antioxidants, anti-allergic, antimicrobial, anti-inflammatory, cardioprotective, anticarcinogenic and vasodilatory effects, etc. Many plants with medicinal value are rich with active metabolites, flavonoids, phenolic acids and terpenoids. These active plant metabolites are useful in the scavenging of free radicals, metal chelating and the reduction of single tone oxygen (Shan et al., 2007; Gromovaya et al., 2008; Koukoui et al., 2015; Zahin et al., 2016).

PHYTOCHEMICALS AS ANTIOXIDANTS

Experiments have shown that medicinal plants are rich in antioxidant compounds such as phenols, carotene, and tocopherols. These plants produce huge amounts of these biologically active compounds that protect against free radicals. In addition to containing some minerals such as A, C, and E, which act as antioxidants. Where, these compounds control the inhibition of oxidation resulting from reactive oxygen species (ROS), affecting the dynamics of the interaction, leading to a delay in aging and the treatment of many cancers. Therefore, it was recommended by the World Health Organization and institutions concerned with human health that these plants should be used effectively (Michalak, 2022).

The compounds that contain all the chemicals in the human body are called phytochemicals. Several types of plant metabolites such as saponins, flavonoids and tannins have been studied in *Conisa sumatriensis* (Shah et al., 2012). Common metabolites such as tannins, saponins, flupatanins, terpenoids, steroids, glycosides, and flavonoids were found in phytochemical evaluation of plant. ...

Prophylaxis of diterpenoid tumors associated with *Cladonia rangivirina* has been reported. Plants, leaves, roots, flowers and natural resources are important sources of medicinal plants. The flavonoids and phenols of seven medicinal plants from different families were found. *Oldenlandia corymbosa*, *Xanthium strumarium*, *Ricinus communis*, *Terminalia bellirica*, *Tinospora cordifolia*, *Ipomea aquatica*, and *Bryophyllum pinnatum* are found in these plants (Yadav and Agarwala, 2011). The compounds of plant origin prevent hepatitis B by stimulating the immune system. Silymarin, sitosterol, neoandrographolide, philine, curcumin, picroside, betaline, andrographolide, hypophylline, glycyrrhizin and cocoside due to their hepatoprotective properties may be under stimulation of flora (Asadi -Samani et al., 2011).

The phytochemicals from *Bauhinia hookeri* includes corrosive bile, tricyclic procyanidin, corrosive secondary hydroxydynamic, flavonoids have hepatoprotective effects. Phytochemistry plays an important role in plant conservation. There are often many compounds and plants capable of fighting free radicals. Atomic polyphenols have been studied because they are commonly used in food supplements and play an important role in free radical testing for the treatment of liver disease (Rehan et al., 2014).

The protective effect of plants on the liver is due to anticancer and anti-inflammatory properties (Nithianantham et al., 2011). It has also been found that the formation of cell support compounds is stronger than a single component. Cancer inhibitors are drugs commonly used for the combination of phenols and

flavonoids, indicating that Ipomoea potatoes are a major source of normal cell proliferation that can trigger a DPPH response. The relationship between non-reversible phenol levels (e.g. phenolic corrosion) and reactive pitting reactions has been described in several studies in processing plants. The anticancer properties of some active plants have also been considered, for example, *Cichorium intybus* contains the greatest source of cancer inhibitors (Rafique *et al.*, 2014). Cell-supporting phytochemicals absorb the expected protective component of the liver against paracetamol induced damage in mice (Gyawali *et al.*, 2017).

The potential of *Punica granatum* powder for CCl₄ damage leading to cell proliferation and its protective effect on the liver has been considered. The experiments show cellular support and especially liver function. Another synthetic system that protects against free radicals is organic cells derived from vegetables. Promoting wellness and prevention combined with a healthy diet rather than a low-fat diet has a huge impact on understanding normal cell growth. Flavonoids have organic effects such as eliminating free radicals, inhibiting cell proliferation and combating oxidative stress. Many flavonoids have been shown to be oxidants, antioxidants, hepatoprotective and anti-inflammatories (Kumar & Pandey, 2013).

Phenolic compounds that often contain harmful caffeine, corrosive ferulic, and corrosive vanillin are important in preventing cancer. Several phenolic compounds are distributed in certain parts of the plant. Flavonoid aglycones (including quercetin, myricetin, kaempferol, and glycosides) are composed of flavonoids and their cellular production results from various hydroxyl reactions. The redox nature of cell optimization allows them to pursue professional reduction (Darwisd *et al.*, 2008).

A comprehensive report on the phenolic phenotype (TPC) and cellular carrier of therapeutic compounds was used. There is a positive correlation between the rate of cell proliferation and the phenolic properties of *Origanum vulgare* which has the best inhibitory capacity (Spiridon, 2011). Plant compounds are stimulated by tissue physiology and inhibit inflammatory responses. Potential studies on *Cassia auriculata* extract suggest it could be a source of cancer inhibitors. This can be used as a source of cancer prevention during the current treatment period (Gaikwad *et al.*, 2011).

The effects of anticancer medicines has been reported including a wide number of medicinal plants and their derivatives like isoflavones, flavonoids, anthocyanins, coumarin, lignin, catechins and epicatechins, which has an effect significant over zero radicals. *Camellia sinensis*, *Ocimum sanctum*, *Copipalin flute*, *Allium sativum*, *Terminalia bellirica*, *Zingiber officinale* (from the Middle East, Palestine, and India), and a certain Chinese plants and cell boosting compounds are used to treat specific diseases (Numan *et al.*, 2008).

MEDICINAL PLANTS AS THERAPEUTIC MODALITIES

Medicinal plants have been used as a source of medicine since ancient times. They used the plants as they are or after drying and grinding them. These dried parts are used either individually or as a mixture with a mixture of another plant. These plants contain biologically active compounds that are usually extracted by ethanol (Abubakar and Haque, 2020).

Since earlier civilizations, medicinal plants have been used by humans for their survival and growth. In the starting they have been food collectors and food hunters but later on depend mostly on plants. Over the years, traditional knowledge has built up the perception of plant use in food, shelter, cultivation, health care and many physical uses. Specific ways of using plants in accordance with culture, food habits and folk songs were developed for indigenous people and this data is openly transferred generation to generation (Ramakrishna and Saidulu, 2014).

Traditional medicines are key component of the tribals' therapeutic remedies and spiritual existence. WHO (2007) had estimated that the use of conventional treatments in developing countries for primary health care is 80 % and involves, in particular, the use of different extracts extracted from herbal plants

(Prasad et al., 2014). This is an indication that herbal medicinal products play a crucial role in underdeveloped countries' basic health. Identified primary and secondary metabolites develop definite metabolites. The chemical components in plant growth and production are key metabolites. Glucose and chlorophyll, essential for life, are examples of primary metabolites. Secondary metabolites do not participate directly in plant growth and are not necessary to reproduction (Elhardallou, 2011). For many other reasons, secondary plant-generated metabolites are used. It is about regulation of growth, intra and interaction and protection from infections and predators. Among the most important of these phytochemical compounds are Terpenes, Phenolics, Quinones, Polyacetylenes, Polyenes and Alkamides, Carbohydrates, Organic Acids, Alkaloids (Taid et al., 2014). Polyphenols are the most commonly used secondary metabolites that have a wide range of biological activities including antibacterial, anticarcinogenic, antiviral, hepatoprotective, cardioprotective, antithrombotic, anti-allergic, anti-inflammatory and infertility treatment (Trigui et al., 2013).

THE IMPORTANCE OF MEDICINAL PLANTS

Medicinal plants are defined as those plants that are used for treatment in alternative medicine. Medicinal plants have been used in treatment for a long time. Developing countries used it in treatment in an unorganized manner, and with the development of science, the Chinese began to use it in systematic ways. Still, traditional medicine using medicinal plants was the basis in that period, due to several things, including the high population, the spread of epidemics, the exorbitant cost of treatment, and finally the side effects of drugs chemical (Zhou et al., 2020).

The World Health Organization has indicated that the use of medicinal plants in treatment represents 25% of the population in the United States, while it constitutes nearly 80% of the population in developing countries. The most important thing that distinguishes medicinal plants is that they have no side effects or are almost few compared to chemical drugs (Zhu et al., 2019).

Plants are being used for the treatment of various disorders due to their therapeutic as well as nutraceuticals characteristics since a long time prior to the production of synthetic medicines and along with synthetic drugs. It is believed that medicinal plants are used with medicinal purposes, food and several other benefits for humankind (De Lima et al., 2015; Al-Snafi, 2016). Clinical research has shown that conventional drugs such as quinine, aspirin and morphine are all drugs extracted from plants (Butler, 2014). Organic ingredients and alternatives are therefore of considerable importance, and almost 40 percent of pharmaceutical products and their derivatives are produced from herbal plants (Lahlou, 2013). Plants have many bio-active ingredients, such as phenolics, carotenoids, flavonoids, anthocyanins, vitamins, proteins, enzymes etc. which make them a significant source for medicinal activities of plants (Lin et al., 2016).

Plants are being used for medical purposes because of limited side effects in developing countries. It is now the need of current era to explore new medicinal plants due increasing demands of natural, low-cost, safe and health promoting ability of herbal medicinal products (Hosseinzadeh et al., 2015). Herbal remedies are being used for treatment of a vast range of diseases such as skin issues, gastrointestinal complications, heart disease, nervous system problems, infectious diseases, renal problems, liver disorders as well as to manage reproduction disorders both in male and female (Sharma et al., 2014).

Even though pharmaceutical drugs are employed for treating many infectious as well as non-infectious diseases, but they are very costly with several side effects, thus it is important to seek alternative appropriate sources to resolve this problem. In this case, healthy and organic foods obtained from natural plants having abundant phytochemicals can be a hoped to provide balanced diet for a growing population around the world. Moreover, medicinal plants preparations alone and in combination are advantageous to human health (Shahidi, 2009). Taking all these aspects into consideration, this research aimed to track the

therapeutic effects of traditional medicinal plants. The following headings include a literature analysis on various areas of research work on the traditional medicinal plants.

Numerous herbal remedies in food and metabolites have been selected as the source of potential therapeutic agents (Rasmussen and Ekstrand 2014). Alkaloids, glycosides, coumarins, flavonoids, steroids, and other metabolites are among them (Sengul et al., 2011). Herbal medicine has been shown to be an effective and safe place to treat hepatotoxicity (Thirumalai et al., 2011). The plant provides a solid product that builds a system to take the branch to the next level of behavioral development and reduce damage. Rehabilitation plants are used in two ways: solid plant research to treat various diseases by agronomists and by the use of professional health experts such as (Baqar, 2001). Judges use cheap Ayurvedic herbs as an alternative to various ailments (Mahmood et al., 2003). Ordinary people also reiterate the appetite for medicinal plants and pesticides because their cultivators refuse to use them as they wish and destroy new plants that feed them (Malik & Hussein, 2007).

PLANTS AND HEALTHCARE

At the present time, the use of plants and fungi has become necessary in the medical field, as many drugs have been extracted from plants, such as aspirin, which is extracted from the willow plant. Also, shikimic acid is extracted from red anise. Also, in light of the Corona pandemic, many herbal plants were used to supply the necessary medical needs. Not only that, but the parts that are considered waste that were not used from the plant were used in industry, as *Agave sisalana* Perrine leaves were used in the textile industry (Wiesneth, 2019).

The plants are a major source of medicine for the pharmaceutical industry producing new drugs. Instructions for how to prepare it at home began about 5,000 years ago, and Egyptian papyri show many useful spices. About 224 herbs have been found in Huangdi Neijg (Chinese herbal medicine) (Hong and Francis, 2004). The drugs are expensive for everyone, so they depend on physical therapy. Many of the specimens were made from plants and produced as carriers today for use in clinical trials. Similarly, the natural properties of this useful plant are for the home industry for drug promotion (Bhattarai et al., 2008). Several investigations have revealed antimicrobial cells, potentiating and depleting cells from plants (Bokhari et al., 2013). Predictive medicine assists in prognosis, treatment and management of various diseases (Robson & Vaithiligam, 2009). Many doctors recommend painkillers, opiates, and quinine (Fabricant and Norman, 2011). In Asia and Africa, the World Health Organization (WHO) estimates that 80 percent of the world's population uses different medicines.

IMPACT OF PHYTOMOLECULES ON HEPATIC FUNCTION

Liver diseases represent a health burden on the countries of the world, as cirrhosis of the liver is the ninth cause of death in European countries. It was noted that the use of chemical drugs such as colchicine, interferon, non-steroidal anti-inflammatory drugs, and corticosteroids did not bear the required fruits in the treatment of this patient, which prompted scientists to research medicinal plants that have the ability to protect the liver. The treatment of the liver from nature was important due to its easy access and low costs. Recently, the number of people with liver disease has reached 65% of the total number of people with liver diseases (Wiesneth, 2019).

Liver plays major role in the body as the body's primary organ to regulate the body's metabolism including biotransformation and the removal of metabolized substances. It also contributes to the achievement of biochemical pathways such as energy production, the provision of nutrients, development, reproduction, and disease defense. Liver regulates the body's proteins, carbohydrates and fat metabolism, bile secretion and vitamin concentration. Therefore, healthy liver is essential for good health (Ahsan et al., 2009).

Hepatic disorders affect nearly 10% of the population seriously. Hepatitis, liver cirrhosis, hepatic steatosis, fibrosis, alcohol hepatitis and drugs induced hepatitis include most common liver diseases. It was reported that hepatotoxic substances affect the hepatic cells which form covalent links with fatty tissue and produce ROS (Raj et al., 2016). The body is continually subjected to free radicals due to certain external influences (Shanmugasundaram and Venkataraman, 2006). Antioxidants may be used as a treatment scheme to treat hepatic diseases caused by free radical exposure or oxidation (Ben Saad et al., 2021).

For the diagnosis of liver disorders, hepatoprotective medication such as rimonabant or propyl thiouracil or corticoids is used. These drugs have more costly side effects such as diarrhea, constipation, sleeplessness and depression. More cost-effective medicines with minimal side effects are therefore required (Perez-Meseguer et al., 2016). Antioxidants compounds are reported to have hepatoprotective ability in plants with medicinal value (Sanchez-Valle et al., 2012). The medicinal plants contain different antioxidant compounds particularly flavonoids which are crucial for the preventive role of plant extracts towards liver problems (Ahmed et al., 2012). Moreover, literature study have shown the antioxidant potential of plants that can be used to cure liver problems, Fig.1 (Bhandarkar and Khan, 2004; Jain et al., 2008).

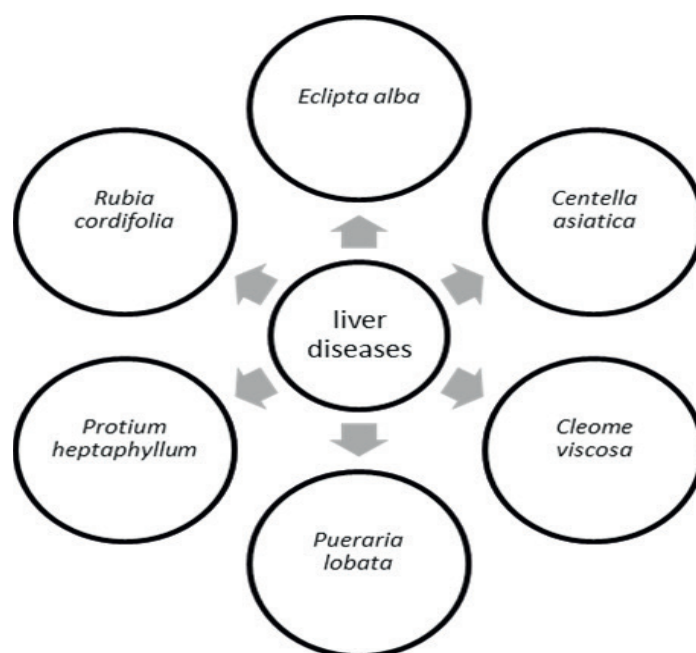


Fig. 1. Important plants family used in treatment of liver disease

The hepatoprotective capacity of cariside II was investigated on evaluating the improvement in liver transaminases in CCl_4 -intoxicated primary cultured rat hepatocytes and results revealed that $200\mu\text{M}$ administration have potential to reduce the 78% reduction in toxic effects. One of the other major flavonol glycoside as Icarin present in *Epimedium* significantly decreased the glutamic pyruvic transaminase and sorbitol dehydrogenase activities and resulting in 76% safety from toxicity at varying concentrations from $1\mu\text{M}$ to $20\mu\text{M}$. The following are widely developed ROS as byproducts of biological or exogenous factors: including singlet-oxygen (O_2), super oxide anion (O_2^-), radical hydroxyl (OH) and hydrogen peroxide (H_2O_2). These free radicals induce oxidative stress to almost every molecule present in living cells, even DNA (Sharma et al., 2001). Thus, an antioxidant mechanism must eliminate excess ROS. The occurrence of a diverse variety of phytochemical constituents plays a crucial role in the protection of hepatic injury due to the free radicals.

The hepatitis B virus (HBV) was eliminated in cell cultures in mice was managed. The effect of Osthole on both hyperlipidemic and alcoholic fatty liver animals was also demonstrated (Zhang et al., 2007; Sun et al., 2010; Du et al., 2011; Zhang et al., 2011). Mechanism studies have shown that osthole modulated multiple lipogenic gene expression (Ogawa et al., 2007), enhanced adiponectin secretion and therefore boosted resistance to insulin by PPAR α / α -activation. Anti-fibrotic osthole activities were also identified on HSC-T6 hepatic cell lines (Shin et al., 2011). ALT and AST levels are the most common used biomarkers for hepatic injury and the assessment of these enzyme activities will determine the increased or reduced intensity of hepatic lesions. After ochratoxin A (OTA) -mediated liver damage and impaired cellular membrane integrity, Jamuna et al., (2018) reported substantial increase in serum ALT, AST and LDH activities. Ameliorative group reduced serum ALT, AAST and LDH activities indicate hepatoprotective WRE impact. (Saxena et al., 2007).

Antioxidants are known to work against illnesses by reducing lipid peroxidation by breaking free radicals and raising endogenous antioxidants. Medicinally important plants contain major phytochemicals such as phenolic acid and flavonoids that are scavengers of free radicals and act as an antioxidant molecules (Cheng et al., 2011). The hepatoprotective effect of plant extracts is pre-investigated due to its antioxidant characteristics. Future studies on hepatoprotective medicinal plants can lead to safety assessments of drug detection in its early stage. Herbal medications are becoming crucial for the treatment of liver disorders in recent decades. Plant remedies are efficient and safe alternative hepatic disease treatment (Yao et al., 2016). Valuable medicinal plants can be tested to treat liver problems since medicinal products are popular worldwide (Armstrong et al., 2014). *In-vivo* and *in vitro* research on plant phenolic and flavonoids have shown excellent potential to prevent liver cirrhosis because of their high antioxidant nature.

As more than 80% of the world is dependent on conventional treatment, WHO focuses on the natural assets of medicinal and aromatic plants (MAP) as a source of disease treatment. Monitoring and categorizing MAP into its native habitats should be a strategic goal and starting “wild” plants into agriculture. As natural resources are plentiful but vary greatly, they should be monitored and tracked in typical environments (Chambers et al., 2011). Synergistic interactions between herbal or phytomedicine substances are of considerable relevance. Synergism frequently explains the effectiveness of preparation, especially in tiny dosages when it is necessary. When separated from the combination, the bioactivity or effectiveness of a component in a herbal mixture generally diminishes. It applies both to single-plant preparations and to phytomedicines that comprise more than one plant. In herbal medications, the utilization of whole or partially purified extracts containing many active components is crucial (O’Leary et al., 2001).

USE OF MEDICINAL PLANTS IN VARIOUS DISORDERS

Some important drugs (podophyllotoxin, taxol, vincristine, camptothecin) are herbicides (Komalavalli et al., 2014). Plant metabolites can alter mineralocorticoid potentials (Nithya & Balakrishnan, 2011). About 25% of these drugs are considered vegetarian in the United States, and 74% of the 119 essential drugs are packaged above traditional medicine.

Local medicinal plants are used to treat hepatitis B (Rasoul et al., 2014), various publications describe inflammatory, anti-fibrosis, anticancer and hepatoprotective effects of these medicinal plants (Brinda et al., 2012). Silymarin is used to treat gallbladder liver problems such as jaundice, hepatitis, and cirrhosis (Rainone, 2005). Several antagonists of negative growth compounds such as vinblastine, taxol, camptothecin, vincristine, subcutaneous, topotecan, irinotecan and etoposide are derived from epipodophilic toxins (Ramot and Merrion, 2008). Anthraquinone injections demonstrate several antibacterial, antifungal, antidepressant, anti-parkinsonian, ED, antiviral and cellular functions (Zargar et al., 2011). Foods high in fats,

flavonoids and phenols may reduce the risk of several malignant tumors, including cancers of the mouth, esophagus, lung, larynx, colon, pancreas and pancreas, according to clinical studies. (Ross and Kassem, 2002). Milk thistle contains stimulants such as liver protection and growth inhibition.

Elephantopus scaber (L) is one of the most often used herbal medicines for controlling fever, as diuretics, and gastrointestinal disorders, as well as treating nephritis, nausea, edoema, pneumonia, scabies, and leukaemia. Phytochemicals of various kinds have been isolated from this plant (Wan et al., 2009).

The disease is treated with a single plant or a mixture of different spices. This herb reduces diseases such as inflammation, liver damage, rashes, fever, and stomach problems (Qureshi et al., 2007). Biological activity and damage tests have demonstrated the presence and compatibility of these plant components (Wan et al., 2009). Rhubarb is one of the most important Himalayan spices and has medicinal properties. About 60 continuous R.emodi models have been shipped worldwide. It has antiviral, antibacterial, sedative, anticancer and anticellular properties (Rahman et al., 2014). Polygonum Short provides brief links between common sites of ethnopharmacologic use, particularly for wound healing, cytotoxicity, liver injury, and protozoan disease. The leaves and heads of *Clitoria ternatea* help treat various conditions such as skin, genitourinary problems, and pain. This plant contains antidepressants, platelet inhibitors, antidiabetics, diuretics, anti-inflammatory and anti-inflammatory drugs (Bhawna and Kumar, 2010).

CONCLUSIONS

Phytochemical plays an important role in health care system. Herbal medicines are used for the treatment of various diseases. International research has proven the effectiveness of medicinal plants in treating many diseases. Where, many medical workers recommend the need to turn to alternative medicine in the treatment of some diseases that have not been proven to have been cured by chemical drugs. However, it is necessary to be careful in the use of these plants, as it cannot be considered that every natural product is safe. In addition to the possibility of some medicinal plants interacting with chemical drugs, which leads to a number of problems, and then we recommend the need to take caution when dealing with these plants, and to conduct many clinical researches to ascertain the effectiveness of these plants.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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