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Review on Medicinal Plants with Reference to Anti-Hepatotoxicity Activity

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Abstract

Liver is one of the most vital organ of the body that performs various functions in maintain the health. Any damage to this organ leads to serious body complication. Recently there is a rise in liver based diseases. Therefore there is a dire need to study plant based medicines that have been used since centuries to overcome this issue. Therefore this review focuses on medicinal plants that have certain anti-hepatotoxicity components.

Keywords: *Dioscorea Yams*; Actinomycetes; Sitosterol

Abbreviations: GOT: Glutamate Oxaloacetate Transaminase; ALT: Alanine Aminotransferase; sGOT: serum Glutamate-Oxalate-Transaminase; GPT: Glutamate Pyruvate Transaminase; AST: Aspartate Transaminase; DPPH: Diphenyl-2-picrylhydrazyl.

Introduction

Medicinal plants play an eminent role in the human health care. Even in the present time majority of the world population i.e. about 80% still relies on the medicines that are predominately based on the plant material [1]. These plants have been used for medicine purposes since immemorial time, and have been in practice either for traditional medicine or ethno medicine practices worldwide. Many ancient cultures like Chinese still rely upon the traditional medicines for curing a variety of diseases. These traditional medicine practices includes the wider range of health care practices that includes folk or tribal's rituals as well as Chinese, Ayurveda, Korean, Siddha medicine, Japanese, Iranian medicine, Unani, ancient traditional African medicine, Muti, Ifá, medieval and Islamic medicine [2].

These practices were based on the experience rather than then scientific significance. These practices have been passed down from generation to generation, although these herbal medicines are very useful in treating diseases but are not always exploited properly. Recently amid Covid-19 conditions a lot of people treated themselves or their relatives using herbal medicines and many of them were successful. Hence a detailed study on these plants and their importance is the dire need of time. About 90% traditional medicine comprises of medicinal plants. It is estimated that approximately 7,500 plants are utilized for health care purposes in traditional medicines. Out of these, about 4,000 plants are either generally unknown. The traditional frameworks of medication, for example, Ayurveda, Siddha, Amchi, Unani and Tibetan each use around 1,200 plants.

What is a Medicinal Plant?

"A medicinal plant is any plant which, in one or more of its organs, contains substances that can be used for therapeutic purposes or which are precursors for the synthesis of useful drugs" [3].

A definition of medicinal plants for the better understanding of its usefulness:

- Parts of plant or the plant used mainly without synthetic components (e.g. decoctions, infusions, etc.) e.g. Cascara bark;
- Extraction from the plant parts either to be used directly or for the hemi-synthesis of its compounds (e.g. hemi-synthesis of sex hormones from diosgenin obtained from *Dioscorea* yams);
- Root, food, spice, perfume used as medicine directly e.g. ginger;
- Fungi, actinomycetes like microscopic plants used to extract as drugs in antibiotics widely. Examples are ergot (*Claviceps purpurea* growing on rye) or *Streptomyces griseus;* and
- Fibre based plants, e.g. cotton, flax, jute, used for the preparation of surgical dressings.

Liver Diseases and Medicinal Plants

Liver is an important organ of the body that is exposed to various threats. Any injury to the organ might lead to organ failure or deterioration of its function. This organ plays a pivotal role in many physiological processes of the body. It is involved in various functions such as metabolism, storage, detoxification, storage and many more. Bile secretion by the liver has an important role in digestion. Diseases of liver are very acute they range from hepatosis (non inflammatory diseases), cirrhosis (degenerative disorder resulting in fibrosis of the liver). Its diseases are mainly caused by various toxic compounds (certain antibiotics, chemotherapeutics, peroxidised oil, aflatoxin, carbon-tetrachloride, chlorinated hydrocarbons, etc.), excess consumption of alcohol, infections and autoimmune/ disorders. Each year a large number of people suffer from chronic liver diseases. Therefore this paper will focus on an in depth review of various medicinal plants having anti-hepatotoxicity.

Digestive System

HSYA inhibited hepatocellular fibrosis resulting from induction of apoptosis of stellate cells responsible for disease development by blocking activation of expression of genes regulated by ERK1/2 (including Bcl-2, cytochrome C, caspase-9, and caspase-3) and thanks to PPAR activation, increase in the activity of antioxidant enzymes, increase in expression of PPAR and MMP-2, decrease in expression of TGF-1 and TIMP-1 and lowering of -SMA level. In the organisms of aging mice and mice exposed to pathological changes, HSYA performed a protective function for the liver and other organs by reducing mRNA levels and the amount of the cyclin-dependent protein kinase inhibitor p16. Similarly, the extract obtained from safflower leaves can perform a protective function against a liver exposed to damage due to the administration of anti-tuberculosis drugs (this pigment caused a significant reduction in AST, ALT and ALP parameters and total bilirubin). Studies with methanol extract also showed the presence of lupeol (a triterpenoid with anti-inflammatory and antineoplastic importance) and -sitosterol (phytosterol which, among other things, causes poorer absorption of cholesterol in the digestive tract). An herbal mixture containing dried safflower flowers and *Salvia miltiorrhiza* root given as an injection (Danhong injection) alleviated gastric mucosal lesions caused by administration of salicylic acid, even with prolonged exposure to the drug. It reduced pepsin production and reduced the pepsin level and gastric related issues.

Discussion

Safflower flowers also have potentially high importance in food production as they can provide an ingredient that enriches meals with nutrients. Petals contain all the necessary amino acids except tryptophan. Flowers from thornless varieties are already popular: they are proven to be high in protein, sugar, calcium, iron, magnesium and potassium. By exploiting these properties, teas, the main ingredient of which are the petals of *C. tinctorius*, were composed and popularized in China and India. However, these petals can be an interesting ingredient for fresh salads, enriching not only the sensory values of products, including flavors (linked to the essential oils contained in the flowers) or values linked to the light coloring of the petals. Such petals could also provide an additional source of valuable bioactive dietary nutrients. However, the dyes found in safflower flowers have not been used in food production to take advantage of their health-giving nature. The exception is herbal teas that contain whole dried flowers. The introduction of HSYA into food production would be very beneficial from a consumer point of view. This flavonoid is widely used in medicine and its addition to foods at the production stage, of course in lower than therapeutic doses, would greatly enhance their health value. Such products would be of significant importance for the reduction of oxidative stress in various tissues and organs and they could show a prophylactic effect against cardiovascular diseases and neoplastic diseases, among others (Table 1).

Name of the plant	Source/family	PPU	HIA	ES	Biochemical and HistopathologicalParameters studied
Orthosiphon stamineus [3]	Lamiaceae	Leaves	Acetaminophen	Methanol extract	AST, ALT and ALP
Baliospermum montanum [4]	Euphorbiaceae	Roots	Paracetamol	Alcohol, chloroform extract	SGPT, SGOT and alkaline phosphate, Histopathological changes in liver.
Tridax procumbens [5]	Asteraceae	Leaves	Carbon tetrachloride	Ethanolic extract	Glutathione, superoxide dismutase and catalase
Glycyrrhiza glabra Linn. [6]	Fabaceae	Root powder	Carbon tetrachloride	Root powder mixed with animal feed	TBARS,CD,SOD,CAT,GST,GSH-Px, GSH, lipid peroxidation
Phyllanthus niruri [7]	Euphorbiaceae	Leaves and fruits	Carbon tetrachloride	Methanolicand aqueous	glutamate oxaloacetate transaminase (GOT)
chlospermumPlanchoni [8]	Coclospermaceae	Rhizomes	Carbon tetrachloride	Aqueous	Total bilirubin Alkaline phosphatase Alanine aminotransferase
Saururus chinensis [9]	Saururaceae	Whole plant	Carbon tetrachloride	Ethanol	alanine aminotransferase (ALT), aspartate
Teng-Khia-U' [10]	Asteraceae	Whole plant	D-galactosamin	Aqueous	serum glutamate-oxalate-transaminase (sGOT)
Fructus Schisandrae chinensis (LFS) with Astragalus [11]	Magnoliaceae	Dried fructus	Carbon tetrachloride	Ethanol	Alanine aminotransferase(ALT)
Cordia macleodii [12]	Boraginaceae	Leaves	Carbon tetrachloride	Ethanol	Glutamate pyruvate transaminase (GPT),
Arachniodes exilis	Dryopteridaceae	Rhizomes		Ethanol	Lipid peroxide, DPPH, ABTS, superoxide anion, hydroxyl radical
Momordica dioica	Cucurbitaceae	Leaves	Carbon tetrachloride	Ethanol	serum glutamate oxaloacetate transaminase (AST)
Swertiamarin isolated from Enicostemma Axillare [13]	Gentianaceae	Whole plant	D-galactosamine	Ethyl acetate	ASAT (IU/l) ALAT (IU/l) ALP (IU/l) Triglycerides (mg/dl)
Asparagus racemosus [14]	Liliaceae	Whole plant	r- radiation	Crude extract	Lipid peroxidation, protein oxidation
CGX,-a modified traditional Chinese herbal drug [15]	-		Carbon tetrachloride	Meoh	alanine transaminase (ALT), aspartate transaminase (AST),
Propolis-is a resinous hive product collected by honeybees from various plant sources [16]	-		D-galactosamin	Aqueous	1,1-diphenyl-2-picrylhydrazyl (DPPH) free radical scavenging activity,
Tephrosia purpurea L. and Tecomella undulate [17]	Fabaceae Bignoniaceae	Aerial parts of tephrosia purpurea and stem	Thioacetamide	Aqueous	serum aspartate aminotransaminase, alanine aminotransaminase

Table 1: Hepatoprotective Activity of the Medicinal Plants.
*PU=Plant parts used, HIA= Hepatotoxicity inducing agents and ES= Extracts studied

Conclusion

The studies of medicinal plant should not be restricted hence emphasis should be laid on opening the new avenues for it's in depth study for the sake of health care.

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