A REVIEW ON THE PHARMACOLOGICAL PROFILES OF ZANTHOXYLUM ARMATUM DC (RUTACEAE)

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ABSTRACT

The extracts of Z. armatum which occupy an important place in the Indian system of medicine are used as carminative, stomachic, antihelminthic and for toothache. It contains volatile oil with active constituents which possess antibacterial, antifungal, hepatoprotective, antidiabetic, anti-inflammatory, insect repellent and larvicidal properties. Few extracts are also shown to have properties for treatment of cardiovascular disorders and inhibition of skin sensitivity. This review may be useful in promoting research aiming at development of new agents for therapeutic applications.

KEYWORDS
Zanthoxylum Armatum, Hepatoprotective, Hypoglycaemia, Cardiovascular Disorders, Antibacterial, Insect Repellent, Acc No 004320 of Manipur University Herbarium.

INTRODUCTION
Zanthoxylum armatum DC (Syn Z. armatum, Acc No 004320 of Manipur University herbarium) is an important medicinal plant which is known as Indian prickly ash: Nepal pepper or toothache tree. The local name of this plant Tejphal (Hindi), Tejvati (Sanskrit), Timur (Nepali) and Mukthru (Manipuri), Szechuan pepper (China) it is widely distributed in N.E India. It is also found in China, Taiwan, Nepal, Philippines, Malaysia, Pakistan, Japan. It is a small tree or large spiny shrub (Photo).

Traditional Uses
The bark, fruits, seeds, leaves and flowers are consumed and the extracts, paste are also used in different countries for different ailments.

In India, the seeds and bark are used for treatment of fever, dyspepsia, cholera, repellant of house flies and snake bite. In Nepal, the fruit decoctions and berries are used for abdominal pain, carminative, antispasmodic, rheumatism, skin diseases, cholera, diabetes and asthma.

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PHYTOCHEMISTRY

Various phytochemical constituents like alkaloids, sterols, phenolics, lignins coumarins, terpenoids, flavonoids and their glycosides and benzomoids, fatty acids, alkenic acids, aminoacids: have been extracted from different parts of the plant ie seed, leaves, fruit, root and barks etc.1. Different extracts with essential oil, Dichloromethane, acetone, Aqueous Ethanol, Methanol, Petroleum ether have different biological activities Larvicidal, Antifungal, Hepatoprotective, Keratolytic, Antiviral, Ant protozoan, Pesticidal/Insecticidal, Antibacterial, Antihelminthic and Allelopathic.1,2,3,4

Pharmacokinetic Properties

The pharmacokinetic study of Z armatum is not done extensively. The raw products - bark, flower, fruit, seed are consumed as food tonic and the extract, decoction, paste are given at the sites for action. The processes of absorption, distribution, metabolism, and excretion are not studied in details. The routes of administration, preparations, side effects of the preparations need to study experimentally in details.

Biological Activities

Some Major Biological Activities are highlighted as below

Hepatoprotective Activities

The ethanol extract of bark/leaves/fruit/seed/flowers which is having phenolics and flavonoids exhibit hepatoprotective activities by normalising the disturbed hepatic enzymes. This activity is shown experimentally. The possible mechanism of action is to condition the hepatocytes for acceleration of regeneration of parenchymal cells (-) thereby protecting against membrane fragility and decreased leakage of enzymes.
into circulation. The antioxidant properties of flavonoids which act as scavengers of free radicals can protect the cell membrane from destruction. The transaminases (ALT/AST) may not leak into blood from necrotic hepatocytes. The hepatoprotective activity of the ethanol extract of the bark of the plant is demonstrated by giving the extracts to male wistar rats.

**Hypoglycaemic Properties**
The hydromethanolic extract of the bark of Z. armatum shows significant reduction of blood sugar level, total cholesterol, triglycerides, LDL, VLDL and significant increase of HDLP. These activities are studied experimentally in the laboratory by inducing hyperglycaemia in experimental animals with the chemicals – alloxan and streptozotocin. Therefore, the different parts of the plant are used as food tonic, lotion, paste etc. for the persons suffering from hyperglycaemia and hyperlipoproteinemia.

**Cardiovascular Disorders**
The crude extract of Z. armatum exhibits antiarrhythmic, spasmylocytic effects which is mediated probably through Ca 2+ antagonist mechanism which may be the pharmacological basis for its medicinal use in GIT, respiratory and cardiovascular disorders. This mechanism is explained by pretreatment of calcium channel blocker Verapamil.

**Anti-Inflammatory**
The extract exhibited significant inhibition of the production of pro-inflammatory cytokines, TNF and IL-6 by PBMC stimulation with lipopolysaccharide in a concentration dependent manner.

**Anti-Bacterial, Antifungal Activities**
The aqueous extract of the pericarp of the fruit showed significant antibacterial activities against gram +ve bacteria (Staphylococcus aureus, Bacillus subtilis) and gram -ve bacteria (E. coli, Salmonella typhi). The MIC is 8-64 µg/ml. The Flavonoid and nonterpenoid shows weak antifungal activity. The essential oil dichloromethane which is extracted from seed, fruit of the plant showed antifungal activity during the study with Alternaria alternate, Aspergillus flavus, Microsporum gypseum, Candida albicans, Curvularia lunata.

**Soothing Effect on Skin**
The lipophilic extract with alcohol gives remarkable soothing effect based on inhibition of sensory irritation from sun bathing, shaving depilation, insect bites and chemical treatment.

**The Methanol Extract of the bark showed the Activity of Inhibition on Keratinocyte Growth**

**Larvicidal Activity**
The essential oil which is extracted from seed, fruit of the plant showed the activity for killing of larvae of Culex quinquefasciatus, Anopheles stephensi, Culex pipiens quinquefasciatus.

**Antiviral Activity**
The methanol and aqueous extract of the dried fruit showed inhibition of HSV-1, Japanese B encephalitis, Influenza.

**Toxic Effects**
The toxicities of the preparations – extracts, decoctions and paste are studied by many researchers. But only few reports may be highlighted. The aqueous extracts of dried fruit of Zanthoxylum armatum which are used extensively in traditional herbal remedies exert their toxic potential in vivo by inducing membrane damage of cellular organelles, chromatin condensation, chromatin marginalisation, chromosome clumping and nuclear DNA damage resulting in subsequent mitotic arrest.

**Miscellaneous**
The Aqueous Extract of the Leaves showed Antiprotozoal Effect on Giardia Lamblia, Plasmodium Berpei. Mosquito and leech repellent: The extract of this plant in mustard and coconut oil base shows better mosquito repellent property when compared with dimethyl pthalate repellent. Essential oil of Z. armatum possesses property of leech repellent. The extracts essential oil from fruit are also used as piscidal and lousidal also. This is used in Assam.

**CONCLUSION**
This review would be useful in promoting research aiming at the development of new agent for therapeutic application based on bioactive chemical compound from indigenous plant sources as an alternative to synthetic chemical compounds.

**REFERENCES**