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A REVIEW ON PHYTOCHEMICAL AND ETHANOBOTANICAL STUDY OF *ZIZYPHUS NUMMULARIA: AN* HERB FROM THAR DESERT

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ABSTRACT

Ziziphus nummularia is a shrub that is grows in Thar Desert. This shrub is used is used as medicine since ancient time. This plant is effective as an anticancer, anodyne, refrigerant, sedativeand stomachic and is used to treat anemia, bronchitis, burns, chronic fatigue, diarrhea, hysteria, loss of appetite and pharyngitis. Phytochemical analysis of leaves and fruit of this shrub confirm the presence of various phytoconstituents such as flavonoids, sterols, tannins, alkaloids, glycosides, pectin, polysaccharides, peptide, saponins, and triterpenoid acids. This plant also shows antibacterial, antifungal, anti-inflammatory, antidiabetic, antiplasmodial, anti-oxidant and cytotoxic effect against cancer cell line. This present paper deals with the review of phytoconstituents and pharmacological action of plant Z. *nummularia.*

Keywords: - Ethnobotany, Phytochemical, *Ziziphus nummularia,*

INTRODUCTION

Ethnobotany deals with traditional and natural relationship between human societies and plants. It is a branch of science consisting of many interesting and useful aspects of plant science, history, anthropology, culture and literature. Such a study in India was promoted by the pioneer work of Jain (1961) who is known as "Father of Indian Ethnobotany". The term ethnobotany was formulated by John W. Harshberger (1895), a botanist in Pennsylvania University to study the existing relationship between plants and aboriginals' communities. There is mutual

relationship between these areas and local community. The area provides shelter or living place to the local community and in return natural wealth of that area protected by these local communities.

Zizyphus nummularia is a shrub that is grown frequently in arid region. It is commonly grown in North West Rajasthan that is a part of Thar Desert. Density of this plant varies in different district of Rajasthan. It is commonly known as "Jharber". Fruit of this plant is a round berry which is black skinned earlier later turned dark brown in color. This plant contains endophytic fungus which produces amylase, protease and lipase enzymes **[1]**.

Ziziphus is a shrub which is upto 2 meter high. This plant is grows in warm and arid climate. The leaves are alternate, entire with prominent basal veins. Leaves are tiny, 1-2 cm by 0.5-2 cm, circular or ovate to elliptic. Leaves are dark green in color with margins entire or toothed. The flowers are small, inconspicuous creamish in color. Sepals are valvate, about 1.5 mm long, ovate-lanceolate in shape. Petals are wedge shaped, longer than stamen, they are about 1.25 mm long. Stamen is about 1 mm long. The fruit is round, reddish brown-black when ripe. Fruits are edible. This plant is used as food by some Lepidoptera species.

Taxonomy:

Kingdom – Plantae

Division – Mangnoliophyta

Class - Magnoliopsida

Order- Rosales

Family –Rhamnaceae

Genus – Ziziphus

Species – nummularia

Common name – jharber, chotiber, bordi

Phytochemistry of *Ziziphus nummularia*

Phytochemical study of this plant revealed the presence of various alkaloids, saponin, fatty acids, triterpenoids and flavonoids.

Alkaloids: -

A 13 membered N-Formylcyclopeptide alkaloid, nummularine has been extracted from bark of *Ziziphus nummularia* and the structure of alkaloid is established by spectroscopic method **[2]**.

Cyclopeptide alkaloids

About a dozen of cyclopeptide alkaloid reported from stem and root bark of this plant. Two alkaloid nummularin-M, nummularin-N and nummularin-O isolated from stem bark of this plant. Along with these known alkaloids a new alkaloid, nummularin-P has been reported from stem bark. It was elucidated by study that

structure of this alkaloid is related to Sativanine-C **[3]**.

Glycosides

A new (25 S) -spirostane was isolated and characterize as nummularogenin, (25 S)-3 alpha-hydroxy -5 alpha- spirostane-2, 12-dione **[4]**.

Saponin

Zizynummin, a new dammaranesaponin isolated from dried leaves of *zizyphus nummularia* , has been assigned the structure β-D- glucopyranosyl – (1→2)-6-deoxy-α-L-talopyranosyl- (1→3)-α-L-arabinopyranosyl-(1→3)-jujubogenin **[5]**.

Anti-inflammatory activity on human Aortic Smooth Muscles cells

It was found that the TNF-α induced phenotypic changes are observed in of human aortic smooth muscle cells (HASMC) due toethanolic extract of Z.nummularia. The treatment of HASMC with extract of this plant decrease cell proliferation, adhesion to fibronectin, migration and invasion. Treatment with this extract resulted in the concentration and time dependent reduction in the TNF-α induces expression of matrix metalloprotease MMP-1 and MMP-9, NF-κB and cell adhesion molecules ICAM-1 and VCAM-1. These data proved the anti-inflammatory activity and also that it can ameliorate the inflammation induced atherogenic phenotype of VSMCs in arthrosclerosis **[6]**.

Antioxidant activity of *Ziziphus nummularia*:-

It has been found out that the ethanolic extract of root bark and lead compound of ziziphus nummularia has potent antioxidant activity on reducing power and inhibition of superoxide radical. However it has been determined that the lead compound has better activity than ethanolic extract **[7]**. Antioxidant activity of fruits of z. nummularia is evaluated using free radical scavenging, ferric reducing antioxidant power and metal chelating assays. It has been found out that acetone sample showed higher antioxidant activity **[8]**. Free radical scavenging activity is shown by fruit extract in dose dependent manner when compared with ascorbic acid **[9]**.

Anti-diabetic of various extract of leaves of *Ziziphus nummularia*

The aqueous, methonolic and saponin extract of leaves of *Z. nummularia* was prepared and it showed that all the extract of leaves of this plant is active towards alpha amylase inhibition activity. From this it can be inferred that extract will be useful in carbohydrate metabolism.so it can be contributed to the management to the treatment of diabetes **[10]**.

Activity of phytoconstituents of leaves

The GC-MS analysis revealed the presence of total 105 and 56 phytocostituents in n-hexane and 70% ethanol extract respectively. The compound which present

in major amount shows various activities like- squalene has antioxidant, anti-inflammatory and antitumor activity; phytol have antimicrobial activity and antitumor activity, anti-stiffness and anti-hypercholesterolemic activity **[11]**.

Antiplasmodial activity from stem bark of *Z. nummularia*

Both alcoholic and hydro alcoholic extract showed their potential toward in vitro antiplasmodial activity against P. falciparum strains MRC-02 (CQ sensitive) and RKL-09 (CQ resistant). Alcoholic extract showed more promising antiplasmodial activity as compared to the hydro alcoholic extract **[12]**.

Activity of leaves against gastrointestinal disorder

The crude extract (Zn. Cr) of leaves of *Z.nummularia* was investigated for antidiarrheal activity in terms of reduction diarrhea droppings as well as for anti-secretory activity in castor oil induced model in mice. It has been revealed that *Z. nummularia* has anti-diarrheal, anti-secretory, anti- spasmodic and anti-ulcer actions, mediated possibly through voltage gated ca^{2+} channel blockade **[13]**.

Cytotoxic effect of Nano particle from z. nummularia leaf extract

Zinc oxide Nano particle (ZnO NPs) are synthesized using leaf extract of *Z. nummularia*. ZnO NPs shows antifungal activity which was better than four standard azole antibiotics and they also showed potent cytotoxic effect against HeLa cancer cell line **[14]**.

Anti-bacterial and anti-fungal activity

Z. nummularia shows potent anti-bacterial and anti-fungal activity against various srains of bacteria and fungus (*Staphylococcus aureus, Streptococcus pyrogenes, Bacillus subtilis, Pseudomonas aeruginosa, Aspergillus niger, Aspergillus flavus, candida albicans and Trichomypha rubrum)* was investigated **[15]**.

Anticonvulsant activity from leaves *Z. nummularia*

Ethanolic extract of leaves of *Z. nummularia* is prepared and it has been found out that ethanolic extract protected the mice against the pentylenetetrazole induced convulsions. Treatment with ethanolic extract reduced the duration of electroshock induced tonic hind limb extension reduced by treatment with its ethanolic extract. Their experiment revealed that the ethanolic extract of leaves of *Z. nummularia* has CNS depressant and anticonvulsant activities **[16]**.

Ethanomedicinal Uses

This is a very important herbal plant from Thar Desert of Rajasthan. Whole plant has medicinal value. Juice of root bark is applied in case of rheumatism. The decoction of root is given in case of fever. Root paste is applied to old wound and ulcers. The powder of stem and bark is

used in diarrhea. Ash of bark mixed in ghee is applied in case of inflammation **[17]**. Leaves of *Z. nummularia* and tea leaves are boiled together and decoction taken to cure cough and cold. Paste of applied on skin disease. Leaves are used to cure scabies and boils **[18]**. Both roots and leaves boiled in water and this water is used as antiseptic. Fruits are eaten raw in fever due to heat stroke **[19]**. Plant is used as astringent and in ulcerated gums **[20]**. The root bark is used as an inflammatory activity **[21]**. It was determined thatthe ethanolic extract of root bark of *Z. nummularia* shows in vitro activity against human breast cancer, leukemia, ovarian cancer, colon adenocarcinoma and human kidney carcinoma cell lines **[22]**. Besides this plants have high leaf fodder production potential (125kgha^{-1} of dry leaf). It could produce 170 kgha^{-1} fodder in alluvial plain receiving annual rainfall between 250-300 mm **[23]**.

CONCLUSION

With the help of our present review on *Z. nummularia* we can say that it produces many types of bioactive compounds which have potential to develop various drug in future. This species has many remarkable biological activities which will be helpful too in various prospective. For this a comprehensive medical study required that encourage the traditional awareness of the herbal medicinal plant. This present review provides various information regarding this plant which purpose to bring in light its benefits to the world and drawing scientific attention.

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