

## A REVIEW ON ZIZIPHUS NUMMULARIA

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### Summary

Herbs have always been the natural form of medicine in India. Medicinal plants have curative properties due to presence of various complex chemical substances of different composition which contain secondary metabolites such as alkaloids, flavonoids, terpenoids, saponin and phenolic compounds distributed in different parts of the plants. *Ziziphus nummularia* (Burm. f.) Wight & Arn., a member of the family Rhamnaceae, commonly known as Jharberi, is used traditionally in the treatment of mental retardation, preventing frequent attacks of colds and influenza, treating diarrhoea, dysentery and colic. It is also used for wound healing, ulcers, pharyngitis, bronchitis, anaemia, irritability, hysteria, burns, fevers and as a nervous tonic. It possesses various compounds like nummularogenin, nummularine-T, nummularine-M and nummularine-N, nummularine-A,-Band-C, Zizymin, ziziphine-N -O, -P, and -Q Mucronin-D, Amphibin-H, nummularine-O, nummularine-P. The present review discusses phyto-chemistry, pharmacology, medicinal properties and biological activities of *Ziziphus nummularia* and its usage in different ailments.

**Key Words:-** *Ziziphus nummularia*, Jharberi, Nummularine, Anti-tumour

## **Introduction**

Traditional medicines are used by near about 60 per cent of the world's population. These are not only used for primary health care in rural areas but also in developing countries. In developed countries modern medicines are predominantly used. While the traditional medicines are derived from medicinal plants, minerals, and organic matter, the herbal drugs are prepared from medicinal plants only. Use of plants as a source of medicine has been inherited and is an important component of the health care system in India. In the Indian systems of medicine, most practitioners formulate and dispense their own recipes; hence this requires proper documentation and research. Public, academic and Government interest in traditional medicines is growing exponentially due to the increased incidence of the adverse drug reactions and economic burden of the modern system of medicine. There are about 45,000 plant species in India. India is the largest producer of medicinal herbs and is appropriately called the "Botanical garden of the world". In rural India, 70 per cent of the population is dependent on the traditional system of medicine [1].

### **Distribution of Species [2]**

#### ***Ziziphus nummularia***

Kingdom: Plantae

Division: Magnoliophyta

Class: Magnoliopsida

Order: Rosales

Family: Rhamnaceae

Genus: *Ziziphus*

Species: *Z. nummularia*

### **Taxonomic Description**

***Ziziphus nummularia (Bordi)***: It is a most commonly occurring much branched thorny shrub species in the Indian desert with a height of 1 – 2 m and light coloured bark. It occupies almost all the habitat except the saline patch and the sand dunes. The average density of Jharber in nine districts of Western Rajasthan is ~ 290 plants/ha; the range is however very wide in all the districts. The fruits are mostly round berries with black skinned fruits in early stage which later turn pale and finally dark brown (CAZRI, 1981). The fruits ripen during late November and December and are much relished by children and women. The fruits are eaten fresh as well as after drying. It contains considerable amount of soluble carbohydrates. The well ripened fruits fetch better prices in market from Rs.1 - 2 /Kg. Sometimes these fruits are grounded (fruits with the stone) and sieved. This powder is consumed alone or mixed with Gur or sugar. A delicious paste locally known as Borakuti is also prepared and it is and relished by young and old alike with great interest and pleasure [3].

### **Common vernacular names [4]:**

Synonyms	:	Jharberi, choti ber, bordi, jujube
Sanskrit	:	Aja-priya, Balakapriya, Bhu-kartaka
Hindi	:	Jharberi, jharber
<i>Bengali</i>	:	Bhubadari, Bhui kul
Gujarati	:	Chanyabor
Tamil	:	Korgodi, Parpalli-gidda, Narielandai
Marathi	:	Chanya-bor, Gangar, Junglebor
Talgu	:	Nelaregu, Jitta reni, Regu kampa
Urdu	:	Zariab, Poast jharberi

Kannada        :        Mulluhannu, Paraji, Parapele

**Other Scientific Names :**

Rhamnus nummularia Burm. f.

Ziziphus rotundifolia Lam.

**Medicinal Uses**

There are large numbers of traditional medicinal uses that are not necessarily based on knowledge of the constituents. According to Ayurveda, the root of *Z. nummularia* is bitter and cooling, and cures coughs, biliousness and headache [5]. The bark cures boils and is good for the treatment of dysentery and diarrhea. The traditional workers of Chhattisgarh, India use fruit to treat common fevers and for vomiting use the seeds with bar sprouts (*Ficus benghalensis*) and sugar. The traditional healers of Bastar region use the dried leaves and powdered bark to dress wounds [6] and are also good in treating tuberculosis and blood diseases. The seeds cure eye diseases and are also useful in leucorrhoea [7]. The leaves are antipyretic and reduce obesity. The fruit is cooling, digestible, tonic, aphrodisiac, laxative and removes biliousness, burning sensations, thirst, vomiting [1]. The fruit is employed as an antidote to aconite poisoning, abdominal pain in pregnancy and externally in poultice and applications for wounds. The kernels increase flesh and strength and are sedative in activity [8].

Ziziphus is beneficial in the treatment of mental retardation. A handful of the dry fruit is boiled in half a litre of water till it is reduced to half. Sugar or honey can be added to taste and given daily at night before retiring. It increases the functioning of the brain by releasing more glutamic acid into the bloodstream. Ziziphus is useful in preventing frequent attacks of colds and influenza. The bark can be used for treating diarrhoea, dysentery and colic. The infusion of the inner covering of the bark is used as a purgative in constipation [9].

Leaf paste is applied on boils and scabies. Jujube is both a delicious fruit and an effective herbal remedy. It aids weight gain, improves muscular strength and increases stamina. In Chinese medicine it is prescribed as a tonic to strengthen liver function. Japanese research has shown that jujube increases immune-system resistance. It is also used as antidote, diuretic, emollient, expectorant. The dried fruits contain saponins, triterpenoids and alkaloids. They are anodyne, anticancer, pectoral, refrigerant, sedative, stomachic, styptic and tonic. They are considered to purify the blood and aid digestion. They are used internally in the treatment of a range of conditions including chronic fatigue, loss of appetite, diarrhoea, pharyngitis, bronchitis, anaemia, irritability and hysteria. The seed contains a number of medically active compounds including saponins, triterpenes, flavonoids and alkaloids. It is hypnotic, narcotic, sedative, stomachic and tonic. It is used internally in the treatment of palpitations, insomnia, nervous exhaustion, night sweats and excessive perspiration. The root is used in the treatment of dyspepsia. A decoction of the root has been used in the treatment of fevers. The root is made into a powder and applied to old wounds and ulcers. The leaves are astringent and febrifuge. They are said to promote the growth of hair. They are used to form a plaster in the treatment of strangury. The plant is a folk remedy for anaemia, hypertonia, nephritis and nervous diseases. The plant is widely used in China as a treatment for burns [10].

### **Phytochemistry of *Ziziphus nummularia***

*Ziziphus nummularia* has revealed presence the alkaloids, saponins and fatty acids, triterpenoids and flavonoids.

### **Alkaloids**

A 13-membered *N*-formylcyclopeptide alkaloid, nummularine-T, has been isolated from the bark of *Ziziphus nummularia* and its structure established by spectroscopic and chemical methods [11].

### **Cyclopeptide alkaloids**

In addition to the known alkaloid nummularine-B, two new peptide alkaloids nummularine-M and nummularine-N have been isolated from *Ziziphus nummularia* and their structures elucidated. Nummularine-M is a 14-membered cyclopeptide and belongs to the integerrinine type, whereas nummularine-N is a 13-membered cyclopeptide like nummularine-B [12].

### **Glycosides**

A new (25 S)-spirostane was isolated and characterized as nummularogenin, (25 S)-3 alpha-hydroxy-5 alpha-spirostane-2, 12-dione [13].

### **Glycosides/saponin**

Zizynummin, a new dammarane saponin isolated from dried leaves of *Ziziphus nummularia*, has been assigned the structure  $\beta$ -D-glucopyranosyl-(1  $\rightarrow$  2)-6-deoxy- $\alpha$ -L-talopyranosyl-(1  $\rightarrow$  3)- $\alpha$ -L-arabinopyranosyl-(1  $\rightarrow$  3)-jujubogenin [14].

## **Pharmacological properties of *Ziziphus nummularia***

### **Anthelmintic activity**

In vitro anthelmintic activity of crude methanolic extract (CME) of the plant was determined against *Haemonchus contortus* by the adult motility assay, the egg hatch test and the larval development assay. In vivo anthelmintic activity was evaluated in sheep naturally infected with gastrointestinal nematodes by administering increasing doses of crude powder (CP) and CME (1.0-3.0g/kg) [15].

### **Antitumor Activity**

Lapachol (2-hydroxy-3-(3-methyl-2-butenyl)-1, 4-naphthoquinone) for the first time was isolated from the plant of *Ziziphus nummularia*. Its anti tumor property alone and in combination with radiation was evaluated in female Swiss albino mice, 6-8 weeks old, bearing sarcoma-180 (S-180) ascetic tumor cells. In female mice

$2 \times 10^5$ , S-180 viable ascetic cells were injected intraperitoneally. Naphthoquinones and their analogs have been reported to have antitumor property against rat tumor walker 256 carcinosarcoma and murphy sternum lymphosarcoma [16].

#### **Antibacterial activity**

Antibacterial zone produced by aqueous and ethanol extracts of plants screened against few medically important bacteria (*B.cereus*). Different parts of the plants were collected, air dried, and powdered in a homogeniser, and 10 g of each plant was used for aqueous and ethanol extraction. The aqueous extraction was done in distilled water for 6 hours at slow heat. The extract was concentrated to  $1/5^{\text{th}}$  of the original volume for antimicrobial assay. For ethanol extraction, the sample was extracted in ethanol kept on a rotary shaker overnight. The filtrate was collected and centrifuged at 5000 rpm. The extract was concentrated to  $1/5^{\text{th}}$  of the original volume and used for antimicrobial assay [17].

The ethanol extracts of *Ziziphus nummularia* inhibited the growth of 9 strains. Aqueous extracts showed less activity than ethanol extracts possibly because i) the same active substances were present in water extracts, but in low concentrations ii) active substances were soluble in organic solvents and, therefore, not present in water extracts. Plant extracts have great potential as antimicrobial compounds, especially in the treatment of infectious diseases caused by resistant microorganisms [18].

#### **Antifertility and abortifacient activity**

Root bark powder of *Ziziphus nummularia* mixed with candy sugar is taken with milk (3-5 g twice a day) induces abortion. Among them 56.75% are abortifacient, 35.13% are contraceptive and 8.1% causes sterility in man. The above mentioned plant species although have many other medicinal uses also, but their abortifacient and antifertility properties of some of the species have also been reported from other areas and countries [19].

**Other Uses:**

Anti diarrheal, anti- inflammatory and anti-congestion activity [20].

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