



Evaluation of Antibacterial, Anthelmintic Activities of Leaves of *Ziziphus oenoplia* (L.) Mill.

P.Venkanna * K.Sudheer Kumar, S.Seetaram Swamy
Dept.of Pharmacognosy, MAK College of Pharmacy, Hyderabad, TS, India

ABSTRACT

An open access  journal

Herbal Medicine sometimes referred to as Herbalism or Botanical Medicine, is the use of herbs for their therapeutic or medicinal value. Herbal medicine is the oldest form of healthcare known to mankind. Herbs had been used by all cultures throughout history. It was an integral part of the development of modern civilization. In recent years, there is a tremendous interest in the possible role of nutrition in prevention of disease. Helminth infections are among the most widespread infections in humans, distressing a huge population of the world. Although the majority of infections due to helminth are generally restricted to tropical regions and cause enormous hazard to health and contribute to the prevalence of undernourishment, anaemia, eosinophilia and pneumonia parasitic diseases.

Supporting Information:

Received: 22 June 2018
Accepted: 27 June 2018
Published: 05 July 2018

Competing Interests:
The authors have declared
that no competing interests
exist.

Corresponding author address

P.Venkanna *
Dept.of Pharmacognosy,
MAK College of Pharmacy,
Hyderabad, TS
India

Keywords: Herbal Medicine *Ziziphus oenoplia* (L.) anticholinergic, antiplasmodial .

Copyright: © 2018
Www.ijaps.net
Published under a
Creative Commons
Attribution 4.0

Introduction

Many drugs commonly used today are of herbal origin. Indeed, about 25 percent of the prescription drugs dispensed in the United States contain at least one active ingredient derived from plant material. Some are made from plant extracts; others are synthesized to mimic a natural plant compound. The US herbal medicine consumption alone was worth US\$ 17 billion in the year 2000 and the global market for herbal medicines today is estimated to be a whopping US\$ 60 billion. The World Health Organization (WHO) estimates that 4 billion people, 80 percent of the world population, presently use herbal medicine for some aspect of primary health care. Major pharmaceutical companies are currently conducting extensive research on plant materials gathered from the rain forests and other places for their potential medicinal value.

Plant Profile

Table:1

VERNACULAR NAMES	
English	<i>Ziziphus oenoplia</i> (L.) Mill.
Hindi	Makkay, Kokal ber
Telugu	Parigi
Sanskrit	Karkandhu
Tamil	Curia
Bengali	Siyakul
Kannada	Barige, Challe
Konkani	Burgi
Malayalam	Vanthutali
Marathi	Burgi, Chini bor, Maastodi
Oriya	Kontaikoli
Nepalese	Aule bayar, Boksi bayar



Fig:01: Plant: *Ziziphus oenoplia* (L.) Mill.

Ziziphus oenoplia (L.) Mill. is a spreading, climbing, thorny shrub. It belongs to the family Rhamnaceae. *Ziziphus* is a genus of about 40 species of spiny shrubs and small trees. The leaves are simple alternate, ovatelanceolate, asymmetric, denticulate, acute, oblique at base, entire, silky pubescent, with three prominent basal veins. The fruit is a globose drupe (fleshy

exo and mesocarp with a hard endocarp), drups very pleasant to eat, black and shiny when ripe, containing a single seed. It ranges from the Indian subcontinent through southern China and South east Asia to northern Australia . It grows along roadside, forests and thickets.

Chemical Constituents

The family is best known pharmaceutically because some taxa accumulate anthraquinones. Alkaloids of the benzylisoquinoline type and the cyclo-peptide type are known from many taxa. The plant is also reported to contain the other cyclopeptide alkaloids like, Zizyphine(F, I, K, N, O, P), amphibine-B, Amphibine-F, frangufoline, Mauritine-D.

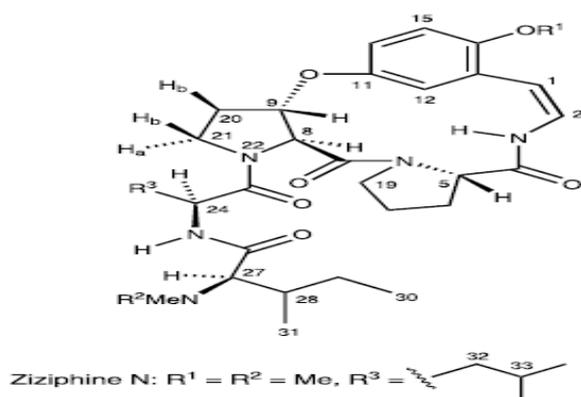


Fig:2 Zizyphine Structure

Medicinal uses:

The plant produces cyclopeptide alkaloids known as ziziphines and has a long history of use intraditional medicine. In India the root is used in Ayurvedic medicine. The Konkani people of Maharashtra use the chewed leaves as a dressing for wounds. In Burma the stem bark is used as a mouthwash for sore throats, for dysentery, and for inflammation of the uterus. The berries are edible and the bark is used for tanning. Research in Thailand has found that extracts of zizyphine from *Zizyphus oenoplia* var. *brunoniana* show antiplasmodial activity against the malarial parasite *Plasmodium falciparum*. Root was used as Anthelmintic and it was used in hyperacidity. Fruits are used in coryza, aphrodisiac, tonic and fevers. The root part is used for the treatment of epilepsy by traditional users. Ethanolic extracts of the aerial parts of the plant exhibit hypotensive effect and low diuretic activity. Ethanolic extracts

of the bark showed anti-inflammatory and anticholinergic activities. Chloroform and methanolic extracts of the bark and leaves showed antibacterial activities. The fruits are edible and used as one of the ingredient in the preparation of stomach-ache pills. Decoction of the root bark is used to promote the healing of fresh wounds.

Collection and Authentication of The Plant Material

The leaves of plant (*Ziziphus oenoplia* (L.) Mill., Rhamnaceae) are collected from surroundings of Nalgonda, Andhra Pradesh, India, in the month of January. The plant material was identified and authenticated by Dr.P.S.UDAYAN, M.Sc.,M.Phil.,Ph.D,Senior Scientist(Taxonomy), Centre for Medicinal Plants Research(CMPR), Aryan Vaidya Sala, Kottakkal. The plant specimen was prepared and submitted in the Department of Pharmacognosy under the voucher no: **06709**.

Extraction of Plant Material

Leaves are collected, dried in shade and powdered. It is then subjected to successive extraction separately in the increasing order of their polarity by using Soxhlet's apparatus. (Benzene Ethyl acetate, Alcohol) Apart from successive extraction, powdered aerial parts are subjected to aqueous extraction separately. Major extraction process was carried out by using solvents like alcohol and distilled water. The thick mass obtained was evaporated with help of rotary vacuum evaporator and percentage yield was calculated for both solvents separately.

Evaluation of Antibacterial Activity

Antibacterial assay of successive leaf extracts of *Ziziphus oenoplia*(L) Mill., was determined using agar well diffusion method as adopted by Kumar et. al. (2010)⁷⁷. Test organisms were Purchased from IMTECH (MTCC), Chandigarh. *Staphylococcus aureus* (MTCC 3160) *Bacillus subtilis* (MTCC 736), *Escherichia coli* (MTCC 739) and *Klebsiella pneumoniae* (MTCC 3384). These bacterial strains were sub cultured in nutrient broth at 37° C. Inoculums were added to the molten nutrient agar medium. Mixed well and poured in to the petriplates then left to solidify at room temperature. Using the sterile cork bore the wells (6 mm) were made in each petriplate. Various concentrations of extracts were pour in to each wells with the help of micropipette. Standard antibiotic (Gentamycin 5µg/ml) was used and vehicle control (water/alcohol) is maintained and packed tightly with parafilm. Then the petriplates were incubated at 37°C for study of their bacteriostatic and bacteriocidal action at 24 and 48 hours. After the incubation period, the

diameter of the zone of inhibition of each well was measured and compared with that of standard and control.

Evaluation of Anthelmintic Assay

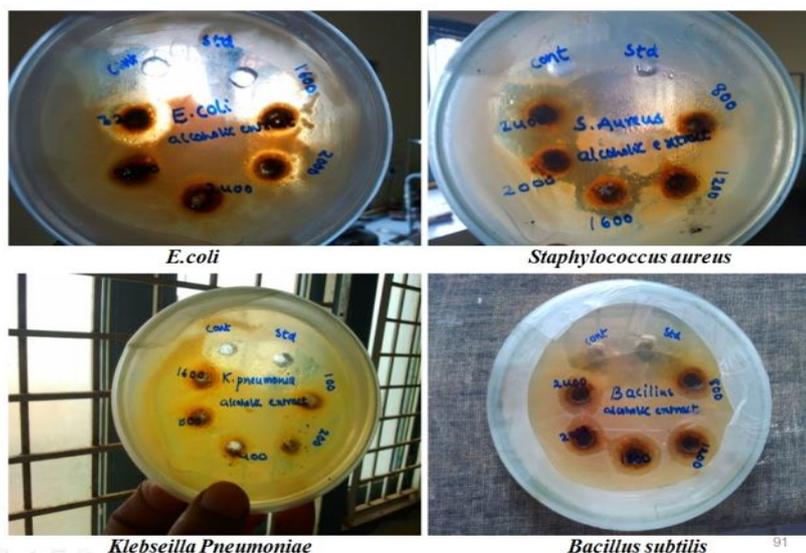
The anthelmintic assay was carried as per the method of ajiyeoba E.O.et al., with minor modifications. The assay was performed on adult Indian earthworm *Pheretima posthuma*, due to its anatomical and physiological resemblance with the intestinal roundworm parasites of human beings. Five different concentrations (25, 50, 100, 200 and 400mg/ml in distilled water) of alcohol extract of leaf of *Ziziphus* were prepared in Petri plates and six worms (same type) were placed in it. Time taken for Paralysis and time for death of worms were recorded. Albendazole was included as reference compound.

Results & Discussion

Antibacterial Activity of Alcohol Extract of Leaf of *ziziphus oenoplia* (L.) Mill.

Alcohol extracts of Leaf of *Ziziphus oenoplia*(L) Mill., was an effective antibacterial substance. It was effective against *Escherichia coli* (Gram –ve), *Staphylococcus aureus* (Gram +ve) and *Bacillus subtilis* (Gram +ve) and alcohol extract do not show any inhibitory effect against *Klebseilla pneumoniae* (Gram –ve).

Fig 03 Antibacterial activity of alcohol extract of leaf of *Ziziphus oenoplia*(L.) Mill.



Organism	Concentration	Ethanol extract	Water extract
Zone of inhibition in diameter (mm) (mean±SD)			
<i>E.coli</i>	100 mg/ml	4.0±0.5	-
	200 mg/ml	4.5±0.2	-
	400 mg/ml	5.0±0.36	-
	800 mg/ml	6±0.8718	-
	1600 mg/ml	8±0.7211	-
	2000 mg/ml	10 ±0.1	-
	2400 mg/ml	12±0.7211	-
	2800 mg/ml	13±0.5292	-
	3200 mg/ml	14±1.217	-
Each value is expressed as mean±SD (n=3).			

Table 2 Antibacterial Activity of Alcohol Extract of Leaf of *Ziziphus oenoplia* (L.) Mill.

Organism	Concentration	Ethanol extract	Water extract
Zone of inhibition in diameter (mm) (mean±SD)			
<i>Staphylococcus aureus</i>	100 mg/ml	4.0±0.5	-
	200 mg/ml	4.5±0.2	-
	400 mg/ml	5.0±0.36	-
	800 mg/ml	6±0.8718	-
	1600 mg/ml	8±0.7211	-
	Each value is expressed as mean±SD (n=3).		

Table 3 Antibacterial activity of alcohol extract of leaf of *Ziziphus* against *S. aureus*

Organism	Concentration	Ethanol extract	Water extract
Zone of inhibition in diameter (mm) (mean±SD)			
<i>B. subtilis</i>	100 mg/ml	4.0±0.5	-
	200 mg/ml	4.5±0.2	-
	400 mg/ml	5.0±0.36	-
	800 mg/ml	6±0.8718	-
	1600 mg/ml	8±0.7211	-
	2000 mg/ml	10 ±0.1	-
	2400 mg/ml	12±0.7211	-
	2800 mg/ml	13±0.5292	-
Each value is expressed as mean±SD (n=3).			

Table 4 Antibacterial activity of alcohol extract of leaf of *Ziziphus* against *B. subtilis*

Organism	Concentration	Zone of inhibition in diameter(mm) (mean±SD) Standard : Gentamycin
<i>S.aureus</i>	5µg/ml	22±0.88
<i>E.coli</i>	5µg/ml	17±1.11
<i>B.subtilis</i>	5µg/ml	19±1.81
Each value represented as mean±SD, n=3		

Table 5 Antibacterial activity of Gentamycin (standard)

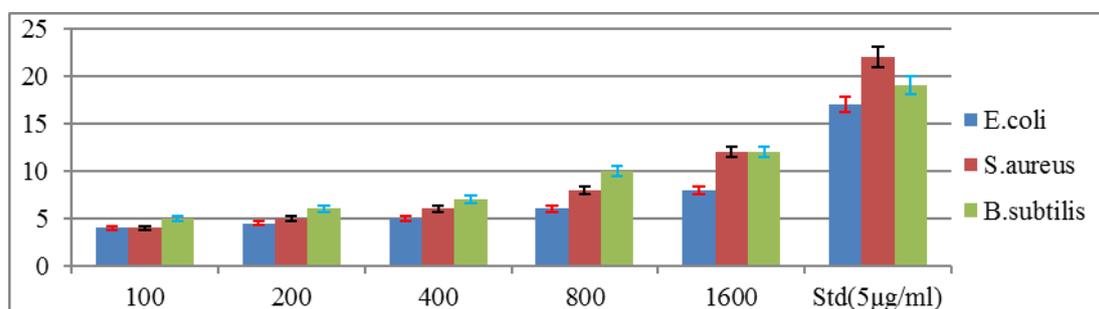


Fig 04 Comparison of Zone of inhibition by alcohol extract of *Ziziphus oenoplia* (L.) Mill., against different bacterial stains

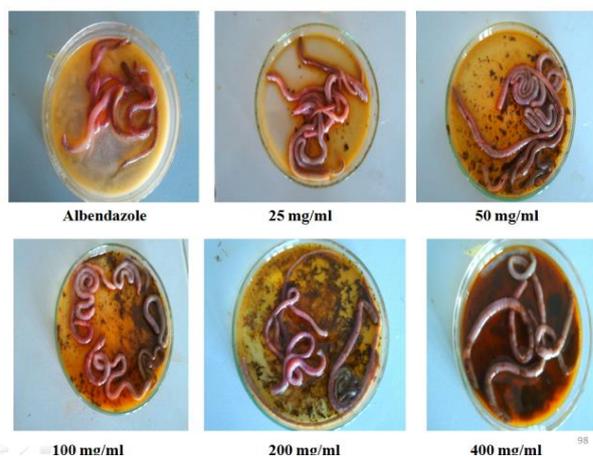


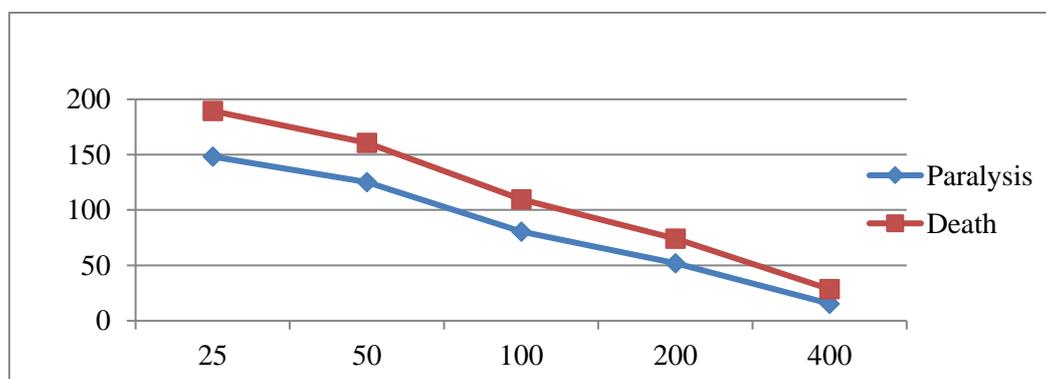
Fig 05 Anthelmintic Activity of Alcohol Extract of leaf of *ziziphus oenoplia* (L.) mill.

Alcohol extract of Leaf of *Ziziphus oenoplia* (L) Mill., was an effective Anthelmintic substance. Albendazole was included as reference compound. The test results were compared with Reference compound Albendazole (10mg/ml) treated samples.

Group	Treatment of Extracts	Con mg/ml	Time taken for paralysis(min)	Time taken for death(min)
1	Experimental control	-	-	-
2	Albendazole (Reference)	10	42.47± 0.4557	69.32±0.8702
3	Ethanol	25	148.2±0.910	189.43±3.075
		50	125.1±1.86	160.56±3.273
		100	80.6±0.7550	109.8±1.952
		200	52±1.0	74.06±3.574
		400	15.42±2.468	28.56±2.512

Each value represent mean±SD, n=3.

Table 6 In vitro anthelmintic activity of alcohol extract of leaf of *Ziziphus oenoplia*



In this plant alcohol extractive values were more when compared with the water extractive values. The antibacterial activity of alcohol extracts is due to the presence of Phenols and Flavonoids. It has been reported that some synthetic Phenols interfere with energy generation in helminth parasites by uncoupling oxidative phosphorylation (Martin 1997). Hence it is possible that these alcohol extract could also produce similar effects.

Conclusion

Antibacterial potentials of alcohol extract of leaf this species were determined using four bacterial strains (*Escherichia coli*, *Staphylococcus aureus*, *Klebsiella pneumonia* & *Bacillus subtilis*) by agar well diffusion method. Alcohol extract not showed antibacterial activity against *Klebsiella pneumonia*. Alcoholic extract of *Z. oenoplia* exhibited anthelmintic activity in dose-dependant manner giving shortest time of paralysis (P) and death (D) with 400mg/ml concentration. The alcohol and water extracts of leaves of plant of *Ziziphus oenoplia* (L) Mill., has significant antioxidant and the alcohol extract has anthelmintic activity, antibacterial potentials against *Escherichia coli*, *Staphylococcus aureus* and *Bacillus subtilis*.

REFERENCES

1. http://www.holisticonline.com/herbal-med/hol_herb-intro.htm
 2. Kokate, C.K., Purohit, A.P., Gokhale, S.B., Text book of Pharmacognosy, 4th edition, Nirali Prakashan. Page no. 31,112-120.
 3. Reddy, K.N., Patnayak, Reddy, C.S., Raju, V.S., Traditional Knowledge on wild food plants in Andhra Pradesh, Indian Journal of Traditional Knowledge, Volume 6(1), 2007, 223.
 4. Anonymous, Census of India, Directorate of Census Operations, Registrar General of India, New Delhi, 2001, 586.
 5. Sachchidananda Prasad, Encyclopedic Profile of Indian Tribes, Volume 3, Botanical Survey of India, Calcutta, 1996.
 6. WHO Traditional medicine strategy 2002-2005, World Health Organisation, Geneva, 2002.
 7. WHO Guidelines, Quality control methods for medicinal plants, Geneva, 1-25, 1998.
- Agarwal, A., Critical issues in quality control of natural products, Pharma Times, 2005, 37(6), 9-11.

9. Dinesh kumar, C., 2007. Pharmacognosy can help minimize accidental misuse of herbal Medicine. *Current science* 93(10): 1356-1359.
10. Patwardhan, B., Vaidya, A.D.B., & Chorghade, M., 2004. Ayurveda and natural products drug discovery. *Curr. Sci.* 86: 789–799.
11. Ashok, D.B., Vaidya & Thomas P.A. Devasagayam., 2007. Recent Advances in Indian Herbal Drug Research Current Status of Herbal Drugs in India: An Overview. *J. Clin. Biochem. Nutr.* 41: 1–11.
12. Sharma, A., Shanker, C., Lalit Kumar, T., Mahendra, S., & Rao, Ch.V., 2008. Herbal Medicine for Market Potential in India: An Overview *Academic Journal of Plant Sciences* 1(2): 26-36.
13. Satakopan, S., 1994. Pharmacopeia Standards for Ayurvedic, Siddha and Unani Drugs. In *Proceedings of WHO Seminar on Medicinal Plants and Quality Control of Drugs Used in ISM.* Ghaziabad, p: 43.
14. Handa, S.S. & V.K. Kapoor, 1995. *Textbook of Pharmacognosy*, Vallabh Prakshan, Delhi, 2nd Edn., p: 121.