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ANTIMICROBIAL ACTIVITY OF *UPAVISHA* AND ITS CLINICAL CORRELATION WITH CONTEMPORARY SCIENCE: A REVIEW

Rohit Kumar Khatik, Anita Sharma and Aarti Kondel

Dept. of Agadtantra, National Institute of Ayurved, Aamer Road, Jaipur, Rajasthan India.

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Correspondence to Author:
Dr. Rohit Kumar Khatik

MD (Scholar),
Department of Agadtantra & Vyavhara Ayurved National Institute of Ayurved, Jaipur, India.

E-mail: drrohitnia@gmail.com

ABSTRACT: In Ayurveda, there are less toxic herbal drugs known as *upavisha*. *Upavisha* are mostly use in various diseases with many therapeutically preparations. As per Ayurveda, *Upavisha* is group of less toxic drug. These drugs are either not having all ten *gunas* or they have less potent *gunas.* The properties of these drugs are to cure acute and chronic disease. These groups also have antimicrobial/ anti-infective activity. *Ayurvedic* formulation having these drugs can be used in various microbial disorders. The classical preparations of all *upavisha* are indicated in mostly chronic ailments, *vatavikara*, neuromuscular disorder, gastrointestinal disorder and skin disorder.

INTRODUCTION: *Ayurveda* has richest source of pioneer health knowledge and treatment as well as preventive and curative. *Ayurveda* has eight branches. *Agad tantra* is one of the most important branche of *Ayurveda* which deals with study of all animal, herbal and other poisonous substances, sign, symptoms and management. The *Visha* (poison) is divided in two major groups, *sthavar visha* (vegetative and mineral poison) and *jangam visha* (animal poison) [1]. *Sthavara visha* is again divided in to *visha* and *upavisha*. The number of *visha* and *upvisha* are nine and eleven respectively. According to *Acharya Sadananda Sharma upavisha* are following;

- Vishatinduk beeja (Nuxvomica)
- Ahiphen (Opium)
- Jaipal (Purging croton)
- Dhatturbeeja (Thorn apple)
- Bhanga (Indian Hemp)
- Gunja (Indian Liquorice)
- Bhallatak (Marking Nut)
- Arka ksheera (Madar)
- S0.nuhi ksheera (Common milk hedge)
- Langali (Malabar Glory Lily)
- Karveera (Indian oleander) [2]

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Strychnos nuxvomica:

The antibacterial activity and antifungal activity of Strychnos nuxvomica extracted from n-butanol, methanol, distilled water were tested against *Staphylococcus, aureus, Salmonella and Klebsiella pneumonia*. The antifungal activity in same solvent of nux vomica were tested against *Aspergillus*

terreus, and *Aspergillus flavus*. Maximum zone of inhibition, was observed when n-butanol extract of *Strychnos-nux vomica* was were used aginst the said bacterial and fungal oraganism. The aqueous extract of *Strychnos nux vomica* does not showed any activity on bacteria and fungus [33]. Antibacterial activity of ethylacetate extract of Strychnos nuxvomica, exhibited maximum zone of inhibition against *Bacillus, Brochothrix, Clavibacter, Ancylobacter* and *Brevibacterium* were observed [34].

Papaver somniferum:

Antibacterial effects of opiates that had been showed in different studies [35]. Antibacterial and antifungal effects of bupivacaine and morphine are reported, but they are dose dependent [36].

Croton tiglium:

Antibacterial activity of the ethanol extract of *C. tiglium* show inhibitory activity against (Shalid et al. 2008). Antimicrobial activity of different plant extracts on pathogenic bacteria was studied and reported by other worker [37]. The leaf and seed extract of *Croton tiglium* possesses antibacterial and antifungal activities against the microorganisms tested. A total of seven microorganisms which consists of four bacteria and three fungi (*Staphylococcus aureus, Staphylococcus epidermidis, Escherichia coli, Pseudomonas Aeruginosa, Candida albicans, Trichophyton rubrum* and *Microsporum canis*) were tested [38].

Datura metel:

Several reports have been carried out with antimicrobial activity against bacteria, bacterial pathogens and fungi (Sakthi et al., 2011 and Ali and Shuab, 1996). The different extracts was tested for its antimicrobial activity against one gram (+) bacteria (*S. aureus*) and three gram (−) bacteria (*E. coli, K. pneumoniae* and *P. aeruginosa*) on nutrient agar plates using disc Diffusion method [39].

Cannabis sativa:

The various extracts of *C. sativa* in were tested and got antibacterial and antifungal activity against two Gram-positive bacteria *Bacillus subtilis* and *Staphylococcus aureus*, two Gram negative bacteria, *Escherichia coli* and *Pseudomonas aeruginosa* and two fungi *Aspergillus niger, Candida albicans* [40].

Abrus precatorius:

The different concentration methanol extracts of *Abrus precatorius* L. plant shows antimicrobial activity against the tested organisms in the order of *Staphylococcus aureus, Vibrio cholera, Yersinia enterocolitica, Salmonella typhi, Bacillus subtilis, Listeria monocytogenes, Klebsiella pneumonia, Bacillus megaterium*. In case of fungi activity against tested organisms was in the order of *Aspergillus niger, Candida albicans*. In case of the maximal antibacterial activity was observed against *Klebsiella pneumonia* [41]. The antibacterial activity of *A. precatorius* seed methanolic crude extracts showed maximum antibacterial activity on *Klebsilla pneumonia*, followed by *Staphylococcus aureus, Streptococcus mitis and Micrococus luteus* [42].

Semecarpus anacardium:

The preformed compounds like saponins also have antifungal properties (Aboabaet al., 2001). Many plants contain non-toxic glycosides that can get hydrolyzed to release phenolics that are toxic to microbial pathogens (Aboaba et al., 2001). The compounds detected may be responsible for the antibacterial activity of the nuts of *S. anacardium* L.f. Several research works were done on phenolic constituents (Govindachari et al., 1971; Prakasa Rao and Ramachandra Rao, 1973).

An Ayurvedic preparations of *S.anacardium called "Bhallatakasava"* was shown to have antibacterial activity against tetanus causing micro organism [43]. Alcoholic and oil extracts of *S.anacardium* dry nuts have antimicrobial activity against Gram-positive and Gram-negative bacteria [44]. Anacardic acid from the nuts exhibited antimicrobial properties [45]. Alcoholic extract of dry nuts showed dose dependant antifungal activity *in vitro* against *Aspergillus fumigatus* and *Candida albicans.* At 400mg/ml concentration, growth of both fungi were inhibited and considerable reduction in size of cells, hyphae, and reduced sporulation was also observed [46].

Calotropis procera: Antibacterial property of Calotropis dry latex, the main target is the bacterial

cytoplasmic membrane. Damage also occurs to the outer membrane in gram-negative bacteria and the cell wall in gram-positive cells [47]. Calotropis latex content is having the antifungal (*Aspergillus flavus*) property and can kill Several fungi [48].

Euphorbia nerifolia:

The methanol extract of plant *Euphorbia neriifolia* possess significant antimicrobial activity in term of antibacterial and antifungal effects (two gram positive bacteria *Staphylococcus aureus* and *Streptococcus aerugenosa* and four gram negative bacteria *Escherichia Coli*, *Pseudomonas aeruginosa, Salmonella typhi*, *Proteus vulgaris* and two fungi *Aspergillus niger*, *Candida albicans*. This antimicrobbial property against bacteria and fungi surely is due to presence of some antimicrobial substances in stems [49].

Gloriosa superb:

The antibacterial activity results of seeds and tubers extracts of *G. superba* showed excellent effect against the five gram positive and gram negative bacteria. The result of tuber extracts presented maximum zone of inhibition was observed on *B. cereus* in methanol 250 µl concentration followed by *E. coli, S. fecalis, K. pneumonia, S. aureus, P. aeruginosa, S. cremoris, P. vulgaris, B. subtilis* and minimum zone of inhibition observed on *S. typhi* [50]. Phytochemicals from root tubers have wide spectrum action against gram-positive and gram-negative bacteria along with antifungal and mutagenic potential.

The maximum inhibitory activity was seen in methanol extracts. In the case of tuber, the high inhibitory activity was seen in methanol extract against *Proteus vulgaris* and *Bacillus* sp [51] and also in flower and seed, maximum inhibition zone obtained in methanol extract against *Pseudomonas aeruginosa* and *Staphylococcus aureus* respectively (Nikhila *et al*., 2014).

***Nerium indicum* (NI)/ *Thevetia nerifolia*(TN):**

All the extracts displayed broad spectrum of activity against gram +ve bacteria and fungus. The *Nerium indicum* extracts decrease the microbial growth, this suggests that it is, having microbiostatic effects. The results obtained are encouraging as the methanolic, chloroform, hexane extracts have shown considerable antimicrobial activity. The activity of the plant is appreciable considering the importance of microorganisms [52]. An ethnopharmacological screening, plants used in Nepalese traditional medicine were evaluated for antiviral activity.

Methanolic and methanolic-aqueous extracts derived of 23 species were assayed in two *in vitro* viral systems, influenza virus/MDCK cells and herpes simplex virus/Vero cells. *Nerium indicum* showed the highest antiinfluenzaviral activity with 50% inhibitory dose of 10 microg/ml against herpes simplex virus. None of these extracts showed cytotoxic effects [53]. The active phytocomponents of *Thevetia neriifolia* was studied and further the antibacterial activity of the plant extracts was assayed *in vitro* by agar well diffusion method Against two gram positive (*Staphylococcus pneumonia, Staphyococcus aureus*) & two gram negative (*E.coli, Salmonella typhi*) bacterial species found inhibition action [54].

TABLE 1: AYURVEDIC PROPERTIES OF *UPAVISHA* DRUGS [3]

S.N.	*Upvisha* drugs	Properties	Part Used
1.	Vishatinduk (*Strychnos nuxvomica*)	*Rasa-Tikta,Katu; Guna-Laghu, Ruksha, Tikshna; Virya-ushna; Vipaka- Katu; Karma-Aakshepjanana, Vedanasthapan, Sothahar, Shoolprashaman Dosha Prabhava-Kapha-Vata har*	Beeja-majja (mesocarp of seeds)
2.	Ahiphen (*Papaver somniferum*)	*Rasa-Tikta,Kashaya; Guna-Laghu,ruksha,Sukshma, vyvayi, vikashi Virya-ushna; Vipaka- Katu; Karma-Madak,Vedanasthapan, Nidrajanan, Aakshephar; Dosha Prabhava-Kapha-Vata Shamak*	Fruit latex
3.	Jaipal (*Croton tiglium*)	*Rasa-Katu; Guna-Guru,ruksha, Tikshna, Virya-ushna; Vipaka- Katu; Karma- Tikshna Virechaka, Lekhan, Sphotajanan Dosha Prabhava-Kapha-Pitta Shamak*	Seeds

4.	Dhatturbeeja (*Datura metel*)	*Rasa-Tikta,Katu;Guna-Laghu, ruksha,vyvayi, vikashi Virya-ushna; Vipaka- Katu; Karma-Madak, Vedanasthapan, Jantughna, Shoolprashaman; Dosha Prabhava-Kapha-Vata Shamak*	Seeds
5.	Bhanga (*Cannabis sativa*)	*Rasa-Tikta;Guna-Laghu,Tikshna Virya-ushna; Vipaka- Katu; Karma-Madak,Vedanasthapan,Shoolprashaman; Dosha Prabhava-Vata-Kapha Shamak*	Leaves, Latex
6.	Gunja (*Abrus precatorius*)	*Rasa-Tikta,Kashaya;Guna-Laghu,Ruksha,Tikshna Virya-ushna; Vipaka- Katu; Karma-Kushthghna,Vedanasthapan,Keshya, Garbhanirodhaka; Dosha Prabhava-Kapha-Vata Shamak*	Seeds
7.	Bhallatak (*Semecarpus anacardium*)	*Rasa-Katu,Tikta,Kashaya;Guna-Laghu,Snigdha, Tikshnam Virya-ushna; Vipaka- Madhur; Karma- Sphotajanan, Sheetprashaman, Vishaghna Dosha Prabhava-Kapha-Vata Shamak*	Fruits
8.	Arka ksheera (*Calotropis procera*)	*Rasa-Katu, Tikta,; Guna-Laghu, Ruksha, Tikshna Virya-ushna; Vipaka- Katu; Karma-Vedanasthapan, Shothahar, Kushthaghna, Vranashodhana, Jantughna Dosha Prabhava-Kapha-Vata Shamak*	Latex
9.	Snuhi ksheera (*Euphorbia nerifolia*)	*Rasa-Katu;Guna-Laghu, Tikshna Virya-ushna; Vipaka- Katu; Karma-Tikshna Virechaka, Lekhan,Vedanasthapan, Shothahar, Vishaghna Dosha Prabhava-Kapha-Vata Shamak*	Latex
10.	Langali (*Gloriosa superba*)	*Rasa-Katu, Tikta,; Guna-Laghu, Tikshna Virya-ushna; Vipaka- Katu; Karma-Raktotklesh, Kshobhak, Krimighna, Garbhapatan Dosha Prabhava-Kapha-Vata Shamak*	Tuber (Root)
11.	Karveera (*Nerium indicum*) (*Thevetia nerifolia*)	*Rasa-Katu, Tikta,; Guna-Laghu, Ruksha, Tikshna Virya-ushna; Vipaka- Katu; Karma-Shothahar, Kushthaghna, Vranashodhana Dosha Prabhava-Kapha-Vata Shamak*	Root, Root's bark

TABLE 2: CHEMICAL COMPOSITION OF EACH DRUG OF *UPAVISHA*

S.N.	Drugs	Composition
1.	Vishatinduk (*Strychnos nuxvomica*)	Strychnine, Brucine [4]
2.	Ahiphen (*Papaver somniferum*)	Morphine, Codeine, Thebaine, Papaverine, Noscapine [5]
3.	Jaipal (*Croton tiglium*)	Crotin (toxalbumen), Crotonside (glycoside) [6]
4.	Dhatturbeeja (*Datura metel*)	Scopolamine, Hyosciamine, Atropine, Meteolodine [7]
5.	Bhanga (*Cannabis sativa*)	Tetrahydrocannabinol, Cannabidiol, Cannabinol, β-caryophyllene (Some of the 483 compounds identified are unique to Cannabis) [8]
6.	Gunja (*Abrus precatorius*)	Abrin, Abrine, abralin [9]
7.	Bhallatak (*Semecarpus anacardium*)	Semecarpol, Bhilawanol [10]
8.	Arka ksheera (*Calotropis procera*)	Calotropin, Calotoxin, Uscharin, Gigantin [11]
9.	Snuhi ksheera (*Euphorbia nerifolia*)	Neriifolione, Neriifoliene, atriterpene [12]
10.	Langali (*Gloriosa superba*)	Colchicine, Gloriosine [13]
11.	Karveera (*Nerium indicum*) (*Thevetia nerifolia*)	Neriodorin, Neriodorein, Karabin, Scopoletin, Scopolin Pruvoside, Ruvoside, Nariifolin, Cerberin [14]

TABLE 3: *AYURVEDIC* MEDICINAL PROPERTIES OF EACH CONSTITUENTS OF *UPAVISHA* [15]

S.N.	Drugs	P.V. Sharma	Uses in Nighantus	Ayurvedic Formulation
1.	Vishatinduk	*Aakshepahar*	*Kushthaghna, Kandughna, Vatarogahar, Arshoghna*	*Agnitundivati, Navjivan ras, Lakshmivillas ras, Krimimudagar ras,*
2.	Ahiphen	*Madakari*	*Agnivivardhanam, Kantiviryabalprada, Grahi, Shleshmaghnam*	*Ahiphenasava, Nidrodaya vati, Dugdhavati, Karpur ras,*
3.	Jaipal	*Tiksnavirechana*	*Krimihar, Jalodarvinashaka, Sarpadashtavishahar*	*Jalodarari ras, Jwaramurari ras, Ichchhabhedi ras*
4.	Dhattur-beeja	*Shoolahar*	*Kantikari, Twagdoshahar, Kandughna, Jwarahar,*	*Unmadgajankusharas, Sootsekharras, Kankasav,*
5.	Bhanga	*Madakari*	*Mohahar, Deepan, Nidraroga,*	*Jatiphaladi Choorna, Madnanand modak*
6.	Gunja	*Upvisha*	*Indraluptahara, Kandughna, Kushthaghna,*	*Gunjabhadra ras,*
7.	Bhallatak	*Kushthaghna*	*Kriminashan, Gulmahar, Arshoghna*	*Bhallatak tail, Amritbhallatak Yoga, Tila arushkar Yoga,*
8.	Arka ksheera	*Tiksnavirechana*	*Kriminashan, Gulmahar, Arshoghna*	*Arka vati, Arka Lavana,*
9.	Snuhi ksheera	*Tiksnavirechana*	*Unmaad,Meha, kushthaghna, Arsha, Visha-dushivishahar*	*Snuhyadi Tail*
10.	Langali	*Garbhashaya-sankochak*	*Krimighna, Kushthaghna, Shoshhar*	*Kasisadi Taila, Langali rasayan*
11.	Karveera	*Hridya*	*Krimighna, Kandughna, Chakshushya,*	*Karveeradya Taila, Karveer yoga*

TABLE 4: MEDICINAL PROPERTIES OF EACH CONSTITUENTS OF *UPAVISHA*

S.N.	Drugs	Indications
1.	Vishatinduk	Identification of targets for suppression of inflammation and cancer [16,] Pharmacologically *Strychnos nux-vomica* showed anticancer, antimicrobial, antiinflammatory, antioxidant, and anti feederent activity, Their specific effects on gastrointestinal problem, nervous system, blood glucose level, bones cells and cardiovascular systemshave been also investigated [17].
2.	Ahiphen	It beneficial in migraine,malaria, dysmenorrhoea, cystitis, menorrhagia and other painful conditions [18].Seed oil, free from narcotic principles is useful in diarrhoea and dysentery [19].
3.	Jaipal	Seed oil have anti leukemic action [20]. Antinociceptive and Smooth Muscle Relaxant Activity of Seed [21].
4.	Dhattur-beeja	Seed were used to treat vertigo, epilepsy and hydrophobia [22]. It also cures Cholera, chronic diarrhoea, intermittent fever [23].
5.	Bhanga	
6.	Gunja	The seeds are used in various diseases like alopecia, edema, helminthes, skin diseases, itching, urinary disorders [24] and also use in treatment of ulcer and diarrhea [25].
7.	Bhallatak	It beneficial in Sciatic neuralgia, early stage of rheumatoid arthritis and spondylitis [26.]
8.	Arka ksheera	The latex is used for treating ringworm, guinea worm blisters, scorpion stings, venereal sores and ophthalmic disorders; also used as alaxative [27, 28].
9.	Snuhi ksheera	It havin Anti-inflammatory and analgesic effect [29] and also used in the treatment of

		bronchitis, bleeding piles and in ano-rectal fistula [30].
10.	Langali	It is used for the treatment of ulcers, leprosy, piles, inflammations [31].
11.	Karveera	As an external medicine it is used against all kinds of skin diseases like rash, scabies, ringworm, lice, leprosy and boils, skin eruptions or irritations in herpes and to destroy maggots in wounds [32].

CONCLUSION: By this all review work, It is concluded that *Upvisha Varg* herbs having good efficacy of Anti-bacterial, Antifungal and Antivirus properties. So, these all drugs having good capacity to treat infectious diseases by indigenous method. There is a vast area of research for developing new combinations for infectious disease.

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