



**International Journal of Biology, Pharmacy
and Allied Sciences (IJBPAS)**

'A Bridge Between Laboratory and Reader'

www.ijbpas.com

REVIEW ON THE ANTI-MICROBIAL POTENTIAL OF *DASHANGA AGADA*

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Received 15th Dec. 2023; Revised 19th Jan. 2024; Accepted 1st July 2024; Available online 1st April 2025

<https://doi.org/10.31032/IJBPAS/2025/14.4.8923>

ABSTRACT

Background: Very few studies on *Dashanga Agada* have been performed, but those that have been done have exhibited antibacterial action in vitro experiments, anti-inflammatory activity in scorpion sting envenomation and carrageen-induced paw edema, and analgesic activity in histamine-induced acute inflammation. Based on previously published scientific articles, this report provides an overview of the anti-microbial activities of the *Dashanga Agada* and its component drugs. **Methodology:** Information is gathered from websites like Google Scholar, Research Gate, PubMed, and Scopus. Studies that have demonstrated mild to significant antimicrobial effects are taken into consideration, and those that have not demonstrated any activity are omitted. **Result:** There were more than 70 publications available on the antibacterial activity of individual drugs, and of those, 26 revealed mild to significant antimicrobial activity. **Discussion:** The situations that result from our screening of bite and sting instances eventually lead to one type of infection or another, thus *Krimigna* property is required to combat that. In the above-mentioned formulation majority of the drugs were found *Krimigna* in nature and known to have antimicrobial effects.

Keywords: *Dashanga Agada*, *Visha*, *Keeta*, Envenomation, Antimicrobial

INTRODUCTION

Visha (poison) has been classified into *Sthavar* and *Jangam* [1]. *Dashanga Agada* is one of the formulations explained under *Keeta Visha Prakaran* in the treatise of *Astanga Hrudaya* [2]. It is one of the most widely used formulations in all *Keeta Damsha* (insect bite/sting). On examining the bites and stings clinically, they often mimic infections of the GI, skin, respiratory system, etc. In the formulation most of the drugs possess *Vishagna* (anti-poisonous) and *krimighna* properties, additionally, antimicrobial action so they counteract the pathophysiology of *Keeta Visha*. Here we screen the antimicrobial effect of *Dashanga Agada* and its individual drugs.

MATERIALS AND METHODOLOGY

The classic texts along with relevant research papers were reviewed in the

preparation of this manuscript. The scientific papers that are available free from the websites PubMed, Scopus, Research Gate, Google Scholar, etc. are gathered. Studies that utilized either of the antimicrobial sensitivity tests that have demonstrated minimal to significant antimicrobial effect are taken into consideration, while those that have not are rejected. More than 70 publications were evaluated, and of those, 26 helped give this information. Presented the information with the following headings such as the tests adopted, the names of the organisms, the form of medicine used, and its outcome. We did not mention the repetition of the technique in this data because it is not available in all articles.

Table 1: Ingredients of *Dashanga Agada* Botanical name, Part used & Quantity

S. No.	DRAVYA	SCIENTIFIC NAME	PART USED	PROPORTION USED
1	<i>Vacha</i>	<i>Acorus calamus</i> Linn.	<i>Kanda</i> (Rhizome)	1Part
2	<i>Hingu</i>	<i>Ferula narthex</i> Boiss.	<i>Niryasa</i> (Gummy resin)	1 Part
3	<i>Vidanga</i>	<i>Embelia ribes</i> Burm.	<i>Phala</i> (Fruit)	1 Part
4	<i>Saindava</i>	Rock salt	----	1 Part
5	<i>Gajapippali</i>	<i>Scindapsus officinalis</i> Schott	<i>Phala</i> (Fruit)	1 Part
6	<i>Patha</i>	<i>Cissampelos peltata</i> Hook	<i>Mula</i> (Root)	1 Part
7	<i>Prativisha</i>	<i>Aconitum heterophyllum</i> Wall.	<i>Kanda</i> (Rhizome)	1 Part
8	<i>Shunti</i>	<i>Zingiber officinale</i> Rosc.	<i>Kanda</i> (Rhizome)	1 Part
9	<i>Maricha</i>	<i>Piper nigrum</i> Linn.	<i>Phala</i> (Fruit)	1 Part
10	<i>Pippali</i>	<i>Piper longum</i> Linn.	<i>Phala</i> (Fruit)	1 Part

Table 2: *Rasa Panchaka* of *Dashanga Agada* and *Rogagnata*

S. No.	INGREDIENTS	RASA	GUNA	VEERYA	VIPAKA	KARMA	ROGAGHNATA
1.	<i>Vacha</i> [3a]	<i>Katu, Tikta</i>	<i>Laghu, Tikshna</i>	<i>Ushna</i>	<i>Katu</i>	<i>Deepani, Krimihara, Kaphahara, Vatahara, Vaamak</i>	<i>Shula, Vibandha, Adhmana</i>
2.	<i>Hingu</i> [4a]	<i>Katu</i>	<i>Tikshna</i>	<i>Ushna</i>	<i>Katu</i>	<i>Hrudya, Krimigna, Vatakapha prashamana</i>	<i>Shula roga, Gulma, Hrdroga, Krimroga,</i>

3.	Vidanga [4b]	Katu, Tikta	Laghu, Ruksha, Tikshna	Ushna	Katu	Kriminashana, Vatakaphapaha	Shula, Krimiroga, Udararoga, Adhmana
4.	Saindhava [5]	Lavana	Snigdha	Shita	Madhura	Chakshushya, Hridya,	Hikka
5.	Gajapippali [3b]	Katu	Ruksha	Ushna	Katu	Kaphahara, Vatahara, Agnivardhaka,	Atisara, Krimiroga
6.	Patha [3c]	Katu, Tikta	Laghu, Tikshna	Ushna	Katu	Raktashodak, Vishagna, Tridosha shaman,	Shula roga, Jwara, Kustha,
7.	Prativisha [6]	Katu, Tikta	Laghu, Ruksha	Ushna	Katu	Sangrahika, Kaphapittahara	Krimiroga
8.	Shunti [4c]	Katu	Laghu, Snigdha	Ushana	Madhura	Hrudya, Vatakaphapaha	Agnimandya, Udararoga
9.	Maricha [4d]	Katu, Tikta	Laghu, Ruksha, Tikshna	Ushana	Katu	Shleshmahara, Pittakara, Chedana.	Shula, Krimiroga, Tvagoga
10.	Pippali [3d]	Madhura, Katu, Tikshna	Laghu, Snigdha	Anushna	Madhura	Hrudya, Tridosahara, Rasayana.	Shula, Arsha, Krimi,

Table 3: Research Work on Anti-Microbial Property of *Dashanga Agada*

Title	Method used	Organisms used	Type of Drug used	Results
<i>Dashanga Agada</i> for anti-microbial, anti-fungal and anti-oxidative property by in-vitro activity [7]	In-vitro (Agar well)	<i>E coli</i> , <i>Bacillus subtilis</i> , <i>Staphylococcus aureus</i> , <i>Salmonella typhi</i> and <i>Shigella</i> and fungal strains <i>Aspergillus niger</i> and <i>Candida albicans</i> .	<i>Dashanga Agada</i>	It showed activeness against selected bacterial strains and fungal strains.

Table 4: Research Works on Anti-Microbial Action of Raw Drug of *Dashanga Agada*

Title	Method used	Organisms used	Type of Drug used	Result
In-vitro antibacterial activity of aqueous and ethanolic extracts of <i>Acorus calamus</i> [8]	In-vitro (Agar well diffusion)	<i>Bacillus subtilis</i> , <i>S. aureus</i> , <i>E coli</i> , <i>Proteus mirabilis</i> , <i>Pseudomonas aeruginosa</i>	<i>Vacha</i> (Aqueous, ethanolic extract)	The ethanolic extract of <i>A. calamus</i> was active against both gram-positive and gram-negative bacterial strains. Aqueous extract of <i>A. calamus</i> showed moderate antibacterial activity against gram-positive bacteria only at high concentrations (200µl).
Antioxidant and antibacterial activity of <i>Acorus calamus</i> . L leaf and rhizome extracts [9]	In-vitro (Disc diffusion)	<i>Bacillus cereus</i> , <i>Escherichia coli</i> , <i>Salmonella typhimurium</i> and <i>S aureus</i>	<i>Vacha</i> (Methanol, hexane, and water extract of leaf and rhizome)	Methanol and hexane extracts exhibited comparable antibacterial activity to water extracts.
<i>Acorus calamus</i> Linn.: phytoconstituents and bactericidal property [10]	In-vitro (Tube dilution)	<i>S aureus</i> , <i>Staph epidermidis</i> , <i>Micrococcus flavus</i> , <i>Micrococcus luteus</i> , <i>Bacillus subtilis</i> , <i>E coli</i> , <i>K pneumoniae</i> , <i>Serratia marcescens</i> , <i>P vulgaris</i> , <i>P mirabilis</i> , <i>P aeruginosa</i> , <i>S typhimurium</i> , <i>Enterobacter aerogenes</i> , <i>Aspergillus niger</i> <i>Aspergillus fumigatus</i> and <i>Penicillium chrysogenum</i> .	<i>Vacha</i> (beta Asarone and essential oil)	The antimicrobial assay suggested that beta- Asarone has poorer activity while the essential oil of <i>A. calamus</i> has bactericidal effect, hence could be considered as a local antiseptic agent.
Antibacterial, Anti-fungal, and Phytotoxic activities of <i>Ferula narthex</i> Boiss [11]	In-vitro (Agar well diffusion)	<i>P. aeruginosa</i> , <i>Staph epidermidis</i> , <i>S. aureus</i> , <i>S typhi</i> , <i>K. pneumoniae</i> , <i>Streptococcus pneumonia</i> , and <i>E. coli</i>	<i>Hingu</i> (Methanolic, n-hexane, etc)	The results showed a moderate antibacterial and antifungal effect.

Effect of <i>hing</i> (<i>ferula foetida</i>) on pyogenic bacteria by culture and sensitivity method [12]	In-vitro	Drug-resistant clinical isolates of <i>S aureus</i> , <i>E coli</i> , <i>S hemolytic</i> .	<i>Hingu</i>	<i>Hingu</i> showed antibacterial activity against <i>Staphylococcus aureus</i> and <i>Streptococcus haemolyticus</i> .
Antibacterial activity of <i>Ferula asafoetida</i> : a comparison of red and white type [13]	In-vitro (Disc diffusion)	<i>E coli</i> , <i>S aureus</i> , <i>K pneumoniae</i> , <i>S flex</i> , <i>E faecalis</i>	<i>Hingu</i> (Petroleum, ether, hexane, aqueous, etc)	Extracts of both varieties of <i>Hingu</i> exhibited comparable antibacterial effect.
In vitro antioxidant, antimicrobial, and cytotoxic potential of gold and silver nanoparticles prepared using <i>Embelia ribes</i> [14]	In-vitro (Disc diffusion)	<i>E coli</i> , <i>S aureus</i> ,	<i>Vidanga</i> (Biosynthesised gold and silver nanoparticles using the seed)	These inhibited the growth of <i>E. coli</i> and <i>S. aureus</i> , among which greater activity was found against <i>E. coli</i> .
In vitro Evaluation of Antifungal Activity of the Seed Extract of <i>Embelia Ribes</i> [15]	In-vitro (Agar cup bioassay)	<i>Aspergillus niger</i> , <i>Rhizopus oryzae</i> , <i>Aspergillus terreus</i> , <i>Cladosporium species</i> , <i>Colletotricum crassipes</i> , <i>Collectotricum capsici</i> , <i>Armillaria mellea</i> & <i>Candida albicans</i>	<i>Vidanga</i> (Extracts of seed)	The extract of seed of <i>E. ribes</i> shown antifungal effect.
A comparative antimicrobial evaluation of <i>Embelia ribes</i> Burm. F. And <i>embeliario busta auct. Nonroxb.</i> Fruits [16]	In-vitro (Agar well diffusion)	<i>P aeruginosa</i> , <i>E coli</i> , <i>S. aureus</i> , <i>K aerogenes</i> .	<i>Vidanga</i> (Aqueous and ethanolic)	Ethanol and Aqueous extracts of <i>Embelia ribes</i> Burm. And <i>Embeliario busta auct. Nonroxb</i> inhibited the growth of all the pathogens.
In vitro evaluation of antibacterial activity of leaf extracts of <i>embelia ribes burm.f.</i> - a threatened medicinal plant from Kerala [17]	In-vitro (Agar disc diffusion)	<i>E coli</i> , <i>S aureus</i>	<i>Vidanga</i> (Acetone, petroleum ether extracts of leaf)	The results revealed that the maximum zone of inhibition was observed against <i>Staphylococcus aureus</i> in acetone extract and the minimum zone against <i>E coli</i> in petroleum ether extract. Significant antibacterial activity was observed in leaf extracts of <i>Embelia ribes</i> against both gram-positive and gram-negative bacteria.
Antibacterial activity of <i>embelin</i> [18]	In-vitro (Disk diffusion)	<i>S aureus</i> , <i>Strep pyogenes</i> , <i>Shigella flexneri</i> , <i>S. sonnei</i> , and <i>P aeruginosa</i> ; <i>S typhi</i> , <i>S. boydii</i> , and <i>Proteus mirabilis</i>	<i>Vidanga</i> (<i>embelin</i>)	Significant antibacterial effect of <i>Embelin</i> was observed at 100 mg. The maximum inhibition was observed against <i>Staphylococcus aureus</i> , <i>Streptococcus pyogenes</i> , <i>Shigella flexneri</i> , <i>S. sonnei</i> , <i>Pseudomonas aeruginosa</i> ; and moderate against <i>S typhi</i> , <i>S. boydii</i> , and <i>Proteus mirabilis</i> .
A potential antibacterial agent <i>Embelin</i> , a natural benzoquinone extracted from <i>Embelia ribes</i> [19]	In-vitro (Micro dilution and Agar)	<i>Bacillus cereus</i> , <i>Micrococcus luteus</i> <i>Staph aureus</i> , <i>E coli</i> <i>K pneumoniae</i> , <i>Proteus mirabilis</i> <i>Shigella flexneri</i> and <i>Pseudomonas aeruginosa</i>	<i>Vidanga</i> (n-hexane)	<i>Embelin</i> showed bactericidal activity against Gram +ve organisms, and bacteriostatic against Gram –ve organisms.
Hydration and bactericidal activity of nanometer- and micrometer-sized particles of rock salt-type Mg1-xCuxO oxides [20]	In-vitro (Agar well diffusion)	<i>E. coli</i> , <i>Staph. Aureus</i> .	Water Suspension	Only 10 mol% cupric ions in MgO nanoparticles were eradicated with faster bactericidal kinetics against selected pathogens.
Phytochemical profiling Antibacterial	In-vitro (MIC)	<i>Staphylococcus aureus</i> and <i>Escherichia coli</i>	<i>Patha</i> (Methanol, aqueous,	It showed that the methanol extract of <i>C. Pareira</i> had

and Antioxidant potential of <i>Cissampelos pareira L.</i> leaves extracts [21]			chloroform extracts of the leaf)	significant antibacterial activity against the selected pathogens
Screening for Antimicrobial Activity of <i>Cissampelos pareira L.</i> Methanol Root Extract [22]	In-vitro (Agar diffusion)	<i>E coli, S aureus, B subtilis, E aurogens, A tumefaciens,</i>	Patha (AgNPs)	It revealed that <i>Cissampelos pareira L.</i> has antibacterial effect.
The antibacterial property of <i>Aconitum heterophyllum</i> root alkaloid [23]	In-vitro (Disc diffusion)	<i>S. aureus, S typhimurium, Bordetella bronchiseptica, E coli, Bacillus subtilis, Pseudomonas putida, Pseudomonas fluorescense and Xanthomonas campestris</i>	Ativisha (Alkaloids)	It revealed the antibacterial activity of <i>A. heterophyllum</i> alkaloids.
Antibacterial Activity and Mechanism of Ginger Essential Oil against <i>E coli</i> and <i>S aureus</i> [24]	In-vitro (DIZ, MIC and MBC)	<i>Escherichia coli and Staphylococcus aureus</i>	Shunti (Essential oil)	The GEOs possessed excellent antibacterial activity against two foodborne microorganisms, <i>S. aureus</i> being more sensitive to GEOs than <i>E. coli</i> .
Characterization, Antibacterial and Antioxidant Properties of Silver Nanoparticles Synthesized from Aqueous Extracts of <i>Allium sativum, Zingiber officinale, and Capsicum frutescens</i> [25]	In-vitro (Agar dilution)	<i>Streptococcus faecalis, Bacillus cereus, E coli, Shigella flexneri</i>	Shunti (AgNPs of aqueous extracts of garlic, ginger, and cayenne pepper,)	Ginger nanoparticles being the most active, all the nanoparticles shown strong antibacterial and antioxidant effect.
<i>Zingiber officinale</i> : Its antibacterial activity on <i>Pseudomonas aeruginosa</i> and mode of action evaluated by flow cytometry [26]	In-vitro (Agar well diffusion)	Multi-drug resistant clinical isolates of <i>Pseudomonas aeruginosa</i>	Shunti (Hydro-alcoholic)	The growth of the bacteria and formation of biofilm was found to be effectively inhibited by the hydro-alcoholic extract of <i>Z. officinale</i> .
Phytochemical analysis and antibacterial activity of Pepper (<i>Piper nigrum L.</i>) against some human pathogens [27]	In-vitro (Agar Well Diffusion)	<i>S aureus, S typhi, E coli, Proteus mirabilis and Pseudomonas aeruginosa</i>	Maricha (Ethanol and chloroform)	It showed the antibacterial activity of ethanol and chloroform extract against the selected microorganisms.
Antibacterial Activity and Mechanism of Action of Black Pepper Essential Oil on Meat Borne <i>Escherichia coli</i> [28]	In-vitro (Agar Disk Diffusion)	<i>E coli</i>	Maricha (Essential oil)	BPEO possessed good antibacterial activity against meat-borne <i>E. coli</i> .
Antibacterial activity of pippali proteins (<i>piper longum</i>) [29]	In- vitro (Paper disc and MIC)	<i>E coli, K pneumoniae, Proteus vulgaris, Pseudomonas, S typhimurium, Streptococcus, S aureus, Vibrio cholerae</i>	Pippali (Water extract)	The results indicate that proteins of <i>Piper longum</i> are a good antioxidant and also an anti-bacterial agent. It is effective at lower concentrations and also non-toxic. It shows a broad spectrum of anti-bacterial activity.
Antimicrobial properties of piper fruits [30]	In-vitro (Disc diffusion)	<i>S albus, S typhi, E coli, Pseudomonas aeruginosa, Bacillus megaterium, Aspergills niger</i>	Pippali (various extracts of fruits of different pipers)	Compared to Streptomycin all the extracts exhibited a good antibacterial activity. Some of the extracts showed antifungal activity as well.

In Vitro Antimicrobial Activity of Different Extracts of Long Pepper (<i>Piper longum</i>) and Watercress (<i>Enhydra fluctuans</i>) against Different Pathogenic Bacterial Strains [31]	In-vitro (MIC)	<i>Staph aureus, Staph saprophyticus, E. coli, Salmonella typhi and shigella dysentery.</i>	<i>Pippali</i> (Ethanol, acetone, chloroform)	Different extracts from both plants showed a strong antibacterial activity with MIC<128mg/ml.
Antimicrobial activity of water extracts of <i>trikatu churna</i> and its individual ingredient [32]	In-vitro (Agar well diffusion)	<i>E coli, S aureus</i>	<i>Trikatu and shunti, maricha and pippali</i> (aqueous extract)	It is very effective against different bacterial strains than its individual component.
Evaluation of the antibacterial potential of <i>Trikatu churna</i> and its ingredients, An in vitro study [33]	In-vitro (modified Paper disc diffusion)	<i>P vulgaris, Staphylococcus epidermidis, S aureus, E coli, Pseudomonas aeruginosa, K pneumoniae, S typhi, Enterobacter aerogenes, S Typhimurium</i>	<i>Trikatu</i> (Aqueous, ethanol, methanol, acetone)	<i>Trikatu churn</i> was found to possess a higher rate of phytoconstituents and promising antibacterial activity.

RESULT:

Most of the above-evaluated studies were conducted on *Eshcheria coli*, *Streptococcus aureus*, *Proteus vulgaris*, *Staphylococcus epidermidis*, *Pseudomonas aeruginosa*, *Klebsiella pneumoniae*, *Salmonella typhi*, *Enterobacter aerogenes*, *S. typhimurium*, *Proteus mirabilis*, *Pseudomonas aeruginosa*, by Agar well/diffusion method showed moderate antimicrobial action of all the extract whereas water extract shows minimum action on microbial growth.

Because different study methodologies and organisms were used, no statistical approaches were applied.

DISCUSSION:

In all insect bites inflammation is the primary change that occurs at the site of a bite by the exogenous substance. *Dashanga Agada* is reported for its anti-inflammatory, antimicrobial & analgesic action. Most of the drugs have *Katu Tikta Rasa* which has

the properties of *Krimighna* and *Vishagna* (anti-poisonous) and acts on *Vrana* (wound), *Kandu* (itching), *Kotha* (rashes), *Shoola*(pain), etc. Whereas *Tikshna*, *Ushna Laghu*, and *Ruksha Guna* help in *Shodhana* (purification), *Shoshana* (drying), and *Kaphavaatahara* (reduces *Kapha* and *Vata*) *Karma*. The drugs like *Hingu*, *Gajapippali*, *Prativisha*, *Maricha*, and *pippali* have the properties of *Krimigna*. Maximum drugs were proven for their antimicrobial action. In order to treat *Keeta Visha* (insect bite/sting) and its associated infections, the aforementioned formulation and its component drugs can be employed.

CONCLUSION:

Dashanga Agada is an effective and widely used formulation in the conditions of *Keeta Visha* (insect bite/sting). *Dashanga Agada* and its individual drugs showed an antimicrobial effect in various studies.

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