

## ANTIMICROBIAL POTENTIAL OF POLYHERBO-MINERAL FORMULATION JATYADI TAILA - A REVIEW

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### ABSTRACT

Jatyadi taila is a Polyherbo-mineral ayurvedic preparation which is used for topical application on the burns and scalds. In ayurveda Jatyadi taila is an extremely useful as wound healer as it possesses antimicrobial activity. It is also useful in various skin afflictions. This formulation chiefly contains the plants *Curcuma longa*, *Azadirachta indica*, *Symplocos racemosa*, *Jasminum auriculatum*, *Sesame indicum*, Copper which individually have been successfully shown antimicrobial activity scientifically. This review explains the antimicrobial potential of each ingredient present in this polyherbo-mineral ayurvedic formulation and needs a scientific exploration so as to document its therapeutic effectiveness.

**KEYWORDS:** Jatyadi taila, Antimicrobial, Ayurveda, Wounds, Formulation

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### INTRODUCTION

In India, the times gone by of health care goes reverse to 5000 years B.C., when health care needs and diseases were noted in ancient literatures like 'Rig-Veda' and 'Atharva-Veda'. Later, the texts like 'Charak Samhita' and 'Sushruta Samhita' were documented in about 1000 years B.C. Indian Materia Medica includes about 2000 drugs of natural origin almost all of which are derived from different traditional systems and folklore practices<sup>1</sup>. Ayurveda, which literally means the science of life, is one of the oldest systems of medicines in India. In Ayurveda, the disease treatment is employed to regain the balance of basic elements and functional principles of the body<sup>2</sup>. Charaka Samhita contains a number of modified pharmaceutical preparations such as Asava, Arista, Churna, Avaleha, Vatika, Varti, Taila, Ghrita, Lepa, Mantha, Arka etc. Tailas are preparations in which Taila is boiled with prescribed liquid media [Svarasa etc.] and a fine paste [Kalka] of the drugs specified in the formulation composition. Unless specified otherwise Taila means Tila taila. The medicated Taila will have the odour, colour and taste of the drugs used in the process. If a considerable amount of milk is used in the

preparation, the Taila will become thick and may solidify in cold seasons. Tailas are preserved in good quality of glass, steel or polythene containers. These medicated preparations retain the therapeutic efficacy for sixteen months<sup>3</sup>. Microorganisms are ubiquitous in nature and are vital components in the cycle of Life. The majority are free living organisms growing on dead or decaying matter whose prime function is the turnover of organic materials in the environment. The microorganisms include Bacteria, Fungi & Viruses<sup>4</sup>. Those agents which are used to kill or inhibit the growth of microorganisms are called Antimicrobial agents (AMA). These can be synthetic or natural<sup>5</sup>.

### General Description

Jatyadi taila is used externally for Abhyanga i.e. for Kacchu (Itching), Sphotaka (Boil), Nadhivrana (Fistula), Sastraprahara Vrana (Wounds due to sharp weapons), Dagdha Vrana (Burn ulcer), Danta-Nakha Ksata (Injury caused by teeth and nails), Dusta Vrana (Non-healing ulcer)<sup>6-7</sup>. Jatyadi taila is usually used for topical application on the burns and scalds, with great benefit. Jatyadi taila is an extremely useful wound healer as it possesses antimicrobial activity. It is also useful in

various skin afflictions. It is extremely cooling and hence is to dress the wounds caused by burns and scalds<sup>8</sup>. Jatyadi taila is effective for healing of wounds, sores, eruptions in piles, fistula etc it is used for local application on the affected part 2-3 times a day<sup>9</sup>. The development of bacterial resistance to presently available antibiotics has necessitated the search for new antibacterial agents<sup>10</sup>. Traditionally use of Jatyadi taila is soothing, cleansing healing oil for wounds, ulcers and burns. Also used for haemorrhoids, eczema and psoriasis<sup>11</sup>. Herpes Zoster (Shingles) it is a skin disease caused due to neuron system. Take 500 mg to 750 mg of Kamdudha rasa twice daily with sugar. Apply Sourashtri Darvi jal or honey water and Jatyadi tail or Iremedadi tail. The watery shingles should be dry and should be protected from pus formation<sup>12</sup>. Jatyadi taila is a very good antibacterial useful in dermal disorders, especially in skin ulcer, & also used for arthritis<sup>13</sup>. The Jatyadi taila was also used in the treatment of eczema<sup>14</sup>.

The ingredients of Jatyadi taila are rhizome of Haridra (*Curcuma longa* L.), Seed of Daruharidra (*Berberis aristata* DC.), Leaf of Jati patra (*Jasminum auriculatum* Vahl.), Leaf of Neem patra (*Azadirachta indica* L.), Leaf, Whole plant of Patola patra (*Trichosanthes dioica* Roxb.), Leaf of Karanja (*Pongamia glabra* L.), Root of Yashti madhu (*Glycyrrhiza glabra* L.), Root of Kushtha (*Saussurea lappa* C.B. Clarke.), Rhizome of Katuki (*Picrorhiza kurroa* Royle ex Benth), Root of Manjishtha (*Rubia cordifolia* L.), Heart wood of Padmaka (*Prunus cerasoides* D. Don), Stem bark of Lodhra (*Symplocos racemosus* Roxb.), Whole plant of Abhaya (*Terminalia chebula* Retz.), Flower of Neelotpala (*Nymphaea stellata* Burm. f.), Root of Shweta sariva (*Hemidesmus indicus* R. Br.), Seed of Karanja (*Pongamia glabra* L.), Madhuchchhisht (Beeswax of *Apis indica*), Suddh tuttha {Copper sulphate (purified)}, Oil of Tila (*Sesame indicum* L.), Water<sup>7</sup>.

### Description of ingredients

**Curcuma longa** L. *Curcuma longa* [Zingiberaceae] is a medicinal plant commonly known as 'Turmeric'<sup>15-16</sup>. The herb turmeric possesses the properties like antioxidant, anti-inflammatory, anti-platelet, cholesterol lowering antibacterial and anti-fungal effects. It contains a mixture of powerful antioxidant phytonutrients known as curcuminoids and inhibits cancer at initiation, promotion and progression stages of tumor development<sup>17-18</sup>. It is a strong anti-oxidant, which supports colon health, exerts neuroprotective activity and helps to maintain a healthy cardiovascular system<sup>17</sup>. The plant is used to treat jaundice, gastric ulcer, diabetes<sup>19-22</sup>. The Larvicidal and

insect repellent property of the plant extract was also reported<sup>23-24</sup>. *Curcuma longa* rhizome extracts were evaluated for antibacterial activity against pathogenic strains of Gram-positive (*Staphylococcus aureus*, *Staphylococcus epidermidis*) and Gram-negative (*Escherichia coli*, *Pseudomonas aeruginosa*, *Salmonella typhimurium*) bacteria<sup>25</sup>.

**Berberis aristata** DC. The *Berberis aristata* [Berberidaceae] is a medicinal, known locally as Chitra and Dar-Hald in Hindi, and Dar-E-Hald in Urdu, is a spinous shrub native to mountainous parts of North India and Nepal. These shrubs are distributed throughout the Himalayas. The Antibacterial, antifungal, anti-inflammatory, analgesic, antipyretic activities were reported<sup>26</sup>. Berberine extracts and salts have demonstrated growth inhibition of *Giardia lamblia*, *Entamoeba histolytica*, *Trichomonas vaginalis*<sup>27</sup> and *Leishmania donovani*<sup>28</sup>, with crude extracts being more effective than berberine salts<sup>29</sup>.

**Jasminum auriculatum** Vahl. The *Jasminum auriculatum* [Oleaceae] is a small herb found in south India and the western peninsula. The alcohol free defatted extract of *Jasminum auriculatum* leaves has been reported to contain lupeol and jasminol<sup>30</sup>. Juice of leaves of *Jasminum auriculatum* has been shown to be beneficial in wound healing. The plant reports antioxidant and antibacterial activities of the essential oils<sup>31</sup>. The plant is documented to possess beneficial effects as, aphrodisiac, antiseptic, emollient, anthelmintic, deobstruant, suppurative, leprosy, skin diseases, wounds, corns and aromatherapy. Pharmacological activities of the plant reported so far are anti-microbial, antioxidant, antiulcer, cytoprotective, chemoprotective, wound healing and anti-acne activity. The various ethnobotanical and traditional uses as well as phytochemical and pharmacological activities reported so far from *J. grandiflorum* and this plant is one of the important ingredient of Jatyadi taila<sup>14</sup>.

**Azadirachta indica** L. The *Azadirachta indica* [Meliaceae] is a herbal plant widely distributed in our subcontinent during all seasons. Each part of neem tree has some medicinal property. Neem leave, bark extracts and neem oil are commonly used for therapeutic purpose<sup>32</sup>. Neem oil suppresses several species of pathogenic bacteria such as *Staphylococcus aureus* and *Salmonella typhosa*, all strains of *Mycobacterium tuberculosis* (MTB)<sup>33-34</sup>. The growth of *Salmonella paratyphi* and *Vibrio cholerae* was inhibited<sup>35</sup>. Efficacy of NIM-76, a spermicidal fraction from neem oil was investigated for its antimicrobial action against certain

bacteria, fungi and poliovirus as compared to whole neem oil. Available antimicrobial agents can control the infection but they are expensive and rapid emergence of anti-microbial resistance. Neem may be used for its easy availability and significant effect against bacteria. The neem tree is still regarded as 'village dispensary'<sup>36</sup>. The ethanolic extract of *Azardiratica indica* showed high inhibitory activity against *Escherichia coli*.<sup>37</sup>

***Trichosanthes dioica* Roxb.** The *Trichosanthes dioica* [Cucurbitaceae] it is a well-known plant in the traditional medicine. Based on its traditional use, methanolic extract of the plant was selected for assessment of healing potential in the form of simple ointment using full thickness burn wound model in rats. The effect produced by the extract ointment showed significant healing when compared with the control and standard groups<sup>38</sup>. It is used for overcoming constipation, fever, skin infections and wounds; seeds of the plant is also used as Antihyperglycemic agent<sup>39</sup>.

***Pongamia glabra* L.** The plant *Pongamia glabra* [Leguminosae] is locally known as Karanja, is a mangrove plant. Traditionally, its bark is used in pile; leaves are effective as medicated bath and rheumatic pains; seeds are used in hypertension, bronchitis, whooping cough, skin diseases and rheumatic arthritis; roots are effective in fistulous sores and gonorrhoea and having antimicrobial activity<sup>40</sup>.

***Glycyrrhiza glabra* L** Licorice, [Fabaceae/Papilionaceae] is a plant with a rich ethnobotanical history. The roots are used as a folk medicine both in Europe and in Eastern countries. The root of *Glycyrrhiza glabra* is a traditional medicine used mainly for the treatment of peptic ulcer, hepatitis C, pulmonary and skin diseases, although clinical and experimental studies suggest that it has several other useful pharmacological properties such as anti-inflammatory, antiviral, antimicrobial, antioxidative, hepatoprotective and cardioprotective effects<sup>41</sup>.

***Saussurea lappa* C.B. Clarke.** The plant *Saussurea lappa* [Compositae] is a Himalayan species that occurs at elevations from 2,700-4,000 m in Kashmir, Lahul Valley in Himachal Pradesh and Garhwal in Uttranchal<sup>42</sup>. The roots possess carminative, analgesic, anthelmintic and emmenagogic properties, stimulate the brain and cure blood diseases and liver and kidney disorders. They are prescribed in advance stages of typhus fever, rheumatism, nervous disorders, irregular menstruation, heart diseases, to improve complexion, as a hair wash to kill lice and to turn grey hair to black<sup>43-45</sup>. It contains lappadilactone and seven sesquiterpene lactones as

cytotoxic principles against selected human cancer cell lines<sup>46</sup>.

***Rubia cordifolia* L.** The plant *Rubia cordifolia* [Rubiaceae] in Sanskrit it is known as Manjishtha which has anti-inflammatory, wound healer, astringent, blood purifier, antimicrobial and antiallergic properties. Manjishtha is very useful in most of the skin disorders. Manjishtha, when applied externally, increases peripheral circulation & detoxifies the blood, astringents are used to treat infectious eczema, oozing skin lesions, and pressure sores<sup>47-48</sup>.

***Prunus cerasoides* D. Donn** The *Prunus cerasoides* [Rosaceae] is commonly known as Padmaka in Sanskrit and Wild Black Cherry Himalayan wild Cherry commonly in English. The plant shows maximum medicinal potency during autumn season. The bark gives a strong odor resembling bitter almond when treated with water. Crushed stem bark is applied on injuries<sup>49</sup>.

***Symplocos racemosa* Roxb.** The *Symplocos racemosa* [Symplocaceae] is a traditional Ayurvedic medicine, used for centuries as a menstrual regulator, astringent, refrigerant, ophthalmic, expectorant, anti-inflammatory, hypothermic, astringent, depurative, febrifuge, haemostatic, anticancer and stomachic properties as stated in Bhavprakashan and Sushruta Samhita<sup>50</sup>. The plant extract and isolated salireposides have been evaluated the anti-bacterial effect of *Symplocos racemosa* extracts against acne inducing bacteria the antibacterial activity spectrum of petroleum ether and ethanolic extract of *Symplocos racemosa* was analyzed<sup>51</sup>. Three Gram positive bacteria, *Staphylococcus aureus* (MTCC 737), *Enterococcus faecalis* (MTCC 439), *Bacillus cereus* (MTCC 430) and three Gram negative bacteria *Klebsiella pneumoniae* (MTCC 109), *Pseudomonas aeruginosa* (MTCC 2642), *Escherichia coli* (MTCC 1687) were used. Inoculum size was adjusted to 1 to 2 × 10<sup>7</sup> CFU (Colony Forming Units)/ml by serial dilution with sterilized nutrient broth media. Nutrient agar (pH 7.2-7.4) was used for routine susceptibility testing of non fastidious bacteria<sup>41, 52</sup>. The ethanolic extract of plant shows good antimicrobial activity then petroleum ether extract<sup>53</sup>.

***Terminalia chebula* Retz.** The plant *Terminalia chebula* [Combretaceae] is called the 'King of Medicine' in Tibet and is always listed at the top of the list in Ayurvedic Materia Medica due to its extraordinary power of Healing. The dried ripe fruits of *Chebulic myrobalan* i.e. the synonym of the *Terminalia chebula* has traditionally been used in the treatment of asthma, sore throat, vomiting, hiccough, diarrhea, bleeding piles, gout, heart

and bladder diseases<sup>54-55</sup>. It has antioxidant, free radical scavenging and anti carcinogenic properties<sup>56-57</sup>. Antibacterial activity of *Terminalia chebula* fruit extracts against several bacterial strains has been reported<sup>58-60</sup>.

***Nymphaea stellata* Willd** The *Nymphaea stellata* [Nymphaeaceae]. It is found generally in Tanks and ponds. The vegetable flowers and rhizomes have astringent, demulcent, mild sedative, spasmolytic, antiseptic action and is used in infusion internally for chronic diarrhea, as a douche for leucorrhoea and vaginitis, as a gargle for sore throat also given internally in prostatic, seeds are used in diabetes<sup>61</sup>.

***Hemidesmus indicus* R.Br.** The *Hemidesmus indicus* Asclepiadaceae plant has common name in English is Indian Sarsaparilla and in Sanskrit is Anantamul which is a widely distributed medicinal plant in India. According to Ayurveda, the root is used for diarrhoea, respiratory disorders, skin diseases, syphilis, fever, bronchitis, asthma, eye diseases, epileptic fits in children, kidney and urinary disorders, loss of appetite and rheumatism. The root has a sweet taste and pleasant smell due to the presence of an essential oil. *Hemidesmus indicus* root has anti-mycobacterial and anti-Propionibacterium acnes activity. It is also reported for antioxidant and anti-thrombotic property and the root powder or its water extract increased the water and electrolyte absorption from rat intestine<sup>62</sup>.

**Bees wax** is obtained from the honey comb of the bees *Apis indica* and some other species like *A. mellifera* [Apidae]<sup>63</sup>. Beeswax is a tough, waxy substance that honey bees produce and secrete in thin scales to be used in the formation of honeycomb, the cellular wall of the beehive. Beeswax is used to make fine candles, shoe polish, soap, skincare products, modelling waxes and other products. It is safe to ingest and used as a coating for pills as well as a solidifier for many candy products. Beeswax is known for its high melting point range, of 62 - 64°C (144 - 147°F)<sup>64</sup>.

**Copper** compounds have been used as disinfecting agents for many centuries. Though copper is found to be safe to humans, it is extremely toxic to microorganisms even at low concentrations. Its use as an antifungal agent in resilient liners has not been investigated. Copper sulfate may be considered as an antifungal additive to resilient liners<sup>65</sup>. Its natural ability to reduce the bioburden of environmental microbes is exploited in water purification, paint and building material, and the textile industry. The activity of Cu against Gram-positive cocci such as methicillin-resistant Staphylococcus aureus (MRSA) and Gram-negative bacilli causing food-

associated disease, such as Escherichia coli O157 Campylobacter jejuni and Salmonella spp., has been reported. More recently multidrug-resistant (MDR) and extremely drug resistant (XDR) Mycobacterium tuberculosis (MTB) in South Africa has drawn attention to the spread of tuberculosis in hospitals<sup>66</sup>.

***Sesame indicum* L.** The plant *Sesame indicum* [Pedaliaceae] is a very old cultivated crop and thought to have originated in Africa<sup>67</sup>. Chlorosessamone obtained from roots of sesame has antifungal activity<sup>68</sup>. Sesame lignans have antioxidant and health promoting activities<sup>69</sup>. Sesamin and sesamol were reported to increase both the hepatic mitochondrial and the peroxisomal fatty acid oxidation rate. Sesame seed consumption appears to increase plasma gamma-tocopherol and enhanced vitamin E activity which is believed to prevent cancer and heart disease<sup>70</sup>. Screening of sesame oil for antibacterial activity was done by the disk diffusion method<sup>71</sup>. It was performed using an 18 h culture at 37°C in 10 ml of Mueller Hinton Broth. The cultures were adjusted to approximately 10<sup>5</sup> CFU/ml with sterile saline solution. The *in-vitro* antibacterial activity of sesame oil against dental caries causing bacteria was determined. *Streptococcus mutans* and *Lactobacillus acidophilus* were found to be moderately sensitive to the sesame oil<sup>72</sup>. In Tiv and Idoma areas of Nigeria's Benue state, two breeds of sesame seeds are usually cultivated the *Sesame radiatum* and *Sesame indicum* mainly for their seeds and leaves<sup>73</sup>. The sesame oil obtained from the *Sesame radiatum* also shows antimicrobial activity against various microorganisms<sup>74</sup>. The plant's leaf extract is very effective against bacterial and other common skin infection including yeast<sup>75</sup>.

## CONCLUSION

The past two decades have seen a worldwide upsurge in the use of traditional medicine (TM) and Complementary and alternative medicine (CAM) in both developed and developing countries. The phyto-medicinal therapy is easy to procure and administer with minimal side effects. The ingredients of Jatyadi taila has been proven scientifically for their antimicrobial property. So this suggests that the Jatyadi taila may be having antimicrobial activity, which must be the area of interest for the scientists to explore this Ayurvedic formulation for therapeutic potentials.

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