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Role of Marichyadi Taila in Fungal Infections: A Comprehensive Review

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Abstract

Fungal infections represent a growing global health challenge due to increasing antifungal resistance and the limitations of conventional therapies. Ayurveda has mentioned a skin disorder, dadru whose symptoms resemble with that of fungal infections. So treatment of dadru can be investigated in fungal infections. For that it's important to understand the meaning and symptoms of dadru, its correlations with fungal infection and its treatment mentioned in ayurveda and allopathic science. Traditional medicine offers alternative therapeutic options, among which Marichyadi Taila—a classical Ayurvedic medicated oil—has garnered attention for its potent antifungal and anti-inflammatory properties. This review article explores the role of Marichyadi Taila in the management of fungal infections, focusing on its formulation, pharmacological actions, and therapeutic potential. Drawing from ancient Ayurvedic texts and recent pharmacological studies, the article discusses the antifungal mechanisms of its multi-herbal and mineral components, standardization methods, and clinical implications. The review concludes that Marichyadi Taila offers a promising complementary approach to managing fungal infections, warranting further research and clinical trials for integration into modern healthcare.

Key words: Fungal infections, Marichyadi Taila, Kushtha

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INTRODUCTION

Fungal infections, ranging from superficial dermatophytoses to invasive systemic mycoses, pose significant health challenges worldwide. The rise in antifungal resistance and the side effects associated with conventional treatments have spurred interest in alternative therapies. Dadru is one of the most common skin disorders affecting people of all ages and continues to challenge various medical systems. In recent years, the incidence of this condition has noticeably increased in tropical and developing regions like India. Fungal infections, particularly tinea, share similar symptoms with dadru and are mainly caused by three species of fungi. These infections are classified based on the affected body part: tinea corporis (general skin), tinea cruris (jock itch/groin), tinea capitis (scalp), tinea barbae or tinea sycosis (beard and moustache, also known as barber's itch), tinea unguium (nail), and tinea pedis (athlete's foot). Collectively referred to as dermatophytes, tinea infections are often called ringworm because of the characteristic ring-shaped red patches they produce. In Ayurvedic medicine, fungal infections are diagnosed as "dadru" due to the similarity in symptoms. According to Ayurvedic principles, dadru is caused by the vitiation of the kapha and pitta doshas, which manifest in the skin and lead to the accumulation of toxins. These toxins subsequently accumulate in deeper tissues such as rasa (nutrient plasma), rakta (blood), mamsa (muscles), and lasika (lymphatic fluid). Ayurveda, the ancient Indian system of medicine, provides a wealth of natural formulations that have been used for centuries to treat various ailments, including skin disorders and infections. One such formulation is Marichyadi Taila, a medicated oil renowned for its antifungal, anti-inflammatory, and wound-healing properties. Traditionally used in the management of skin diseases, this oil is a blend of herbal, mineral, and animal-derived ingredients that work synergistically to combat pathogens and promote tissue regeneration. This review aims to elucidate the scientific basis behind the antifungal efficacy of Marichyadi Taila, highlight its formulation and standardization, and discuss its potential application in managing fungal infections.

Materials and Methods

This review was conducted by systematically analyzing both classical Ayurvedic texts and contemporary research articles. The following steps were undertaken:

Literature Search: Databases such as PubMed, Scopus, and Google Scholar were searched using keywords including "Marichyadi Taila," "Ayurvedic antifungal," "medicated oil fungal infections," and "traditional antifungal formulations."Classical Ayurvedic scriptures and pharmacopeias were reviewed to extract historical data on formulation and therapeutic indications.

Selection Criteria: Studies and articles discussing the composition, pharmacological properties, and clinical applications of Marichyadi Taila or its individual components were selected.Research articles that focused on antifungal mechanisms of key ingredients (e.g., *Piper nigrum*, *Curcuma longa*, *Cyperus rotundus*) were included.

Data Extraction: Information regarding the formulation process, standardization parameters, in vitro and in vivo antifungal activities, and clinical outcomes were extracted and compiled.Observations on the physicochemical characteristics (organoleptic properties, viscosity, color, etc.) of the final product were also noted.

Synthesis and Analysis: Data were synthesized to provide a comprehensive view of the antifungal properties of Marichyadi Taila. Comparative analysis

between traditional claims and modern pharmacological evidence was performed to understand the formulation's mode of action against fungal pathogens.

Review of Literature

Ayurvedic Background and Formulation[1,2]

Marichyadi Taila is a classical Ayurvedic formulation designed for the management of various skin disorders, including fungal infections. The formulation comprises 18 ingredients, each selected for its specific therapeutic attributes. Key components include:

Table no. 1 key ingredients in Marichyadi Taila, along with their common English names and the parts of the plant used[1]

Sr.	Sanskrit Name	Latin/English Name	Part Used
1.	Katu Taila (Sarshapa)	*Brassica juncea* (Mustard Oil)	Oil
2.	Viṣa (shuddha Vatsanabha)	*Aconitum ferox* (Purified Aconite)	Root
3.	Gomutra	Cow Urine	Liquid
4.	Marica	*Piper nigrum* (Black Pepper)	Fruit
5.	Haratala	Purified Orpiment	Mineral
6.	Manaḥshila	Purified Realgar	Mineral
7.	Abda (Musta)	*Cyperus rotundus* (Nut Grass)	Rhizome
8.	Arka Paya (Arka)	*Calotropis procera* (Milkweed)	Latex
9.	Karavira)	*Nerium indicum* (Oleander)	Root
10.	Jaṭamamsi)	*Nardostachys jatamansi*	Root/Rhizome
11.	Trivrit	*Operculina turpethum*	Root
12.	Gomaya Rasa	Cow Dung Juice	Liquid
13.	Indravaruni)	*Citrullus colocynthis*	Root
14.	Kushtha	*Saussurea lappa*	Root
15.	Haridra	*Curcuma longa* (Turmeric)	Rhizome
16.	Daruharidra	*Berberis aristata*	Stem
17.	Daru (Devadaru)	*Cedrus deodara* (Deodar Cedar)	Heartwood
18.	Sveta Chandana	*Santalum album* (Sandalwood)	Heartwood

- **Katu Taila (Sarshap Taila):** Mustard oil (*Brassica juncea Linn.*) serves as the base. Its pungent (katu) and heating (ushna) properties aid in enhancing local circulation and penetration of active compounds.[2]
- **Viṣha (Shuddha Vatsanabha):** Purified aconite root, used in minute quantities, contributes to analgesic and anti-inflammatory effects.
- **Gomutra:** Cow urine, which exhibits antimicrobial and antifungal properties.

- **Marica (Black Pepper, *Piper nigrum Linn.*):** Contains piperine, a compound with proven antifungal and anti-inflammatory activities.
- **Haritala (Orpiment) and Manaḥshila (Realgar):** Mineral components that, after purification, provide antimicrobial and skin-healing benefits.
- **Musta (*Cyperus rotundus Linn.*):** Exhibits astringent and anti-inflammatory properties, beneficial in reducing pruritus and inflammation.
- **Arka Payas (Calotropis procera):** The latex of this plant contributes to the formulation's analgesic and anti-inflammatory effects.
- **Additional herbs:** Such as Jatamansi (*Nardostachys jatamansi*), Trivrutta (*Operculina turpethum*), Indravaruni (*Citrullus colocynthis*), Kushtha (*Saussurea lappa*), Haridra (*Curcuma longa*), Daru Haridra (*Berberis aristata*), Devadaru (*Cedrus deodara*), and Chandana (*Santalum alba*). These ingredients collectively enhance the antifungal efficacy and promote wound healing.

Discussion

Pharmacological Basis for Antifungal Activity

Each of these components, through its unique pharmacological profile, contributes synergistically to the overall antifungal, anti-inflammatory, and healing properties of Marichyadi Taila, making it a promising therapeutic option for the management of fungal skin infections.

1. **Murchit Katu Tail / Sarshap Tail (Mustard Oil – *Brassica juncea* Linn.)-**Mustard oil serves as the base of the formulation and is valued for its rich content of allyl isothiocyanate and other bioactive compounds. It exhibits potent antimicrobial and antifungal properties while also acting as a penetration enhancer, which improves the delivery of active ingredients into deeper skin layers. Its heating (ushna) and pungent (katu) properties stimulate local circulation, thereby facilitating the detoxification process and accelerating tissue repair in fungal skin infections.
2. **Visha (Shuddha Vatsanabha – *Aconitum ferox* Wall ex Ser.)-**After proper purification, Vatsanabha is incorporated in minute doses to harness its analgesic and anti-inflammatory effects. The active alkaloids present modulate pain and reduce inflammation, which can help alleviate discomfort and swelling associated with chronic skin infections. Despite its inherent toxicity, controlled use following detoxification protocols contributes to the overall therapeutic efficacy of the formulation.
3. **Gomutra (Cow Urine)-**Cow urine is recognized in traditional medicine for its antimicrobial, antifungal, and detoxifying properties. It contains a variety of bioactive compounds, including enzymes and antimicrobial peptides, which help in controlling the growth of pathogens and promoting skin healing. Its unique biochemical profile supports the formulation's overall cleansing effect, aiding in the removal of toxins accumulated in the skin.
4. **Maricha Churana (Black Pepper – *Piper nigrum* Linn.)**[3]-Black pepper, rich in piperine, plays a dual role in Marichyadi Taila by directly exerting antifungal effects and enhancing the bioavailability of other active compounds. Piperine disrupts fungal cell membranes and interferes with

ergosterol synthesis, which is essential for fungal growth. Additionally, its anti-inflammatory and antioxidant properties contribute to reducing oxidative stress and inflammation in affected skin areas.

5. **Haritala (Yellow Arsenic – Orpiment, *Arsenic trisulfide*)-** Haritala is employed in controlled, minute quantities after extensive purification. Despite the toxicity associated with arsenic compounds, Haritala exhibits antimicrobial and keratolytic properties when used appropriately. It is thought to help in the reduction of hyperkeratosis and microbial load on the skin, thereby promoting healing in fungal infections.
6. **Manahshila (Red Arsenic – Realgar, *Arsenic disulfide*)-** Similar to Haritala, Manahshila is another arsenic-based mineral that, after rigorous detoxification, offers antimicrobial and anti-inflammatory benefits. It aids in controlling microbial proliferation on the skin and supports the reduction of inflammatory responses in fungal infections. Its careful use is crucial to ensure that therapeutic benefits are achieved without undue toxicity.
7. **Musta (Nut Grass – *Cyperus rotundus* Linn.)-**Musta is known for its bitter and astringent properties, which contribute to its anti-inflammatory and antimicrobial actions. It contains bioactive constituents that modulate inflammatory pathways and help alleviate pruritus and irritation associated with fungal skin conditions. Its wound-healing properties further support the repair and regeneration of affected skin tissue.
8. **Arka Payas (Latex of Calotropis procera)-**The latex of Calotropis procera contains a range of bioactive compounds, including cardenolides and proteolytic enzymes, which provide anti-inflammatory, analgesic, and antimicrobial effects. These compounds facilitate rapid tissue repair and help reduce inflammation at the site of infection, thereby aiding in the overall healing process of fungal skin disorders.
9. **Karavira (Nerium indicum Mill.)-** Karavira, derived from Nerium indicum, is used in highly controlled amounts after purification to exploit its antimicrobial and anti-inflammatory properties. Although known for its toxicity at higher doses, its properly processed extracts help manage chronic skin infections by inhibiting microbial growth and reducing inflammatory responses, thereby contributing to skin restoration.
10. **Jatamansi (Spikenard – *Nardostachys jatamansi* D.C.)-** Jatamansi is a revered herb known for its neuroprotective, sedative, and antioxidant properties. In Marichyadi Taila, it contributes antimicrobial activity and helps mitigate stress-induced inflammatory responses, which can exacerbate fungal infections. Its bioactive sesquiterpenes assist in promoting skin regeneration and overall tissue repair.
11. **Trivrutta (Indian Jalap – *Operculina turpethum* Linn.)-** Trivrutta is primarily recognized for its strong purgative and detoxifying effects. Its active constituents, including glycosides and alkaloids, have demonstrated anti-inflammatory and antifungal properties. By promoting systemic detoxification, Trivrutta helps reduce the accumulation of toxins that may contribute to chronic skin infections and inflammation.
12. **Gomaya Rasa (Cow Dung Juice)-** Though less extensively studied in modern scientific literature, Gomaya

Rasa is traditionally believed to harbor potent antimicrobial properties. It is thought to contain a complex mixture of microbial enzymes and bioactive compounds that contribute to its detoxifying and antimicrobial actions. In Marichyadi Taila, it supports the overall antimicrobial profile, enhancing the formulation's efficacy in combating fungal pathogens.

13. **Vishala (Indravaruni – *Citrullus colocynthis* Schrad.)-**Vishala, known as Indravaruni or bitter apple, is rich in cucurbitacins that exhibit significant anti-inflammatory and antimicrobial activities. It plays a critical role in reducing microbial load and inflammation in fungal skin infections. Its strong purgative effect also aids in the systemic elimination of toxins, thereby supporting skin health.
14. **Kushtha (Costus Root – *Saussurea lappa* C.B. Clarke)-** Kushtha is celebrated for its anti-inflammatory, antioxidant, and antimicrobial properties. The bioactive sesquiterpene lactones present in Kushtha help modulate immune responses and inhibit microbial growth, making it a valuable component in the treatment of chronic fungal skin conditions. Its wound-healing properties further assist in the recovery of damaged tissue.
15. **Haridra (Turmeric – *Curcuma longa* Linn.)**[4]-Turmeric is renowned for its active component curcumin, which has been extensively documented for its potent anti-inflammatory, antioxidant, and antifungal effects. In Marichyadi Taila, curcumin disrupts fungal biofilms, reduces inflammatory cytokine production, and accelerates wound healing. These combined actions make Haridra a cornerstone in managing fungal skin infections.
16. **Daru Haridra (Berberis – *Berberis aristata* DC)**[5]- Daru Haridra contains the bioactive alkaloid berberine, which is well-known for its antimicrobial, anti-inflammatory, and antioxidant properties. Berberine disrupts fungal cell membrane integrity and inhibits microbial proliferation. Its efficacy in reducing inflammation further enhances the healing process in fungal infections, making Daru Haridra a critical component in the formulation.
17. **Devadaru (Deodar Cedar – *Cedrus deodara* Roxb.)**[6]- Devadaru is rich in terpenoids and other bioactive compounds that contribute to its anti-inflammatory, antimicrobial, and analgesic properties. Its extracts help soothe irritated skin, reduce inflammation, and inhibit the growth of microbial pathogens. These characteristics support its use in treating fungal infections and promoting skin regeneration.
18. **Chandana (Sandalwood – *Santalum alba* Linn.)**[7]-Chandana contains santalol, a compound known for its cooling, anti-inflammatory, and antimicrobial effects. It effectively reduces inflammation and acts as an antiseptic, which is particularly beneficial in managing fungal infections. The soothing aroma of sandalwood further contributes to its therapeutic appeal, providing a calming effect on inflamed and infected skin areas.

Mode of action

The review of literature indicates that Marichyadi Taila holds significant promise in the management of fungal infections. The formulation's multifaceted approach targets fungal pathogens through several mechanisms:[8,9]

- **Direct Antifungal Action:** Active constituents like piperine and

curcumin directly interfere with fungal cell membranes, leading to cellular disruption and death.

- **Anti-inflammatory Effects:** Reducing inflammation is crucial in managing skin infections. The formulation's anti-inflammatory properties help alleviate the inflammatory response often associated with fungal infections.
- **Enhanced Penetration:** Mustard oil serves as an excellent vehicle, enhancing the transdermal penetration of active ingredients, thereby improving their bioavailability at the site of infection.
- **Synergistic Interaction:** The combination of herbs and minerals in Marichyadi Taila creates a synergistic effect that enhances overall efficacy compared to individual components.

Conclusion

Marichyadi Taila, a traditional Ayurvedic formulation, exhibits significant antifungal potential due to its unique blend of herbal and mineral ingredients. The formulation's ability to disrupt fungal cell membranes, reduce inflammation, and enhance the penetration of active compounds makes it a promising candidate for managing fungal infections. While classical texts and preliminary studies provide a strong foundation for its antifungal use, further clinical research is warranted to integrate this ancient remedy into modern therapeutic protocols effectively.

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