



# EXPLORING THE ANTIFUNGAL POTENTIAL OF AN EXTRAPHARMACOPEIAL AYURVEDIC HERB 'BRIHAT CHAKRAMARDA' (CASSIA ALATA LINN.): A REVIEW

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**Abstract:** Brihat Chakramarda (*Cassia alata* Linn.) commonly referred to as Ringworm senna. Although not prominently featured in classical Ayurvedic texts, Brihat Chakramarda finds mention in certain commentaries, underscoring its therapeutic significance, particularly in addressing dermatological conditions like ringworm. Known as Dadrughna in Ayurveda, Brihat Chakramarda is revered for its ability to alleviate symptoms associated with ringworm and other skin disorders, attributed to its antifungal properties. In light of the rising global prevalence of fungal infections, especially in healthcare settings and among immunocompromised individuals, the search for effective antifungal agents has intensified. Ayurveda, with its holistic approach to health and disease, offers a rich repository of botanical remedies, many of which exhibit potent antifungal activity. Despite the wealth of traditional knowledge, there remains a gap in the exploration of certain medicinal plants like Brihat Chakramarda within the context of modern scientific research. This review aims to bridge this gap by providing an overview of the antifungal potential of Brihat Chakramarda as documented in both traditional Ayurvedic literature and contemporary scientific studies. By synthesizing available evidence, this article highlights the therapeutic relevance of Brihat Chakramarda in combating fungal infections, shedding light on its phytochemical constituents, pharmacological actions, and clinical applications. Through a comprehensive exploration of this botanical resource, we aim to contribute to the growing body of knowledge on natural antifungal agents and facilitate further research into the therapeutic potential of Brihat Chakramarda in different healthcare practices.

**Keywords:** Ayurveda, Brihat Chakramarda, Antifungal, Dadrughna.

## INTRODUCTION

*Brihat Chakramarda* botanically identified as *Cassia alata* Linn belonging to the family Fabaceae is an ornamental shrub, distributed from tropical America to India. It is commonly known as Ringworm senna. This plant is used as a folklore medicine for the treatment of skin diseases like Scabies, Eczema, Pruritus, Ringworm and other fungal infections.<sup>[1]</sup> *Cassia alata* is an extra pharmacopial herb in Ayurveda since there are no mentions of the herb in any of the original treatises of Ayurveda however a brief description of the herb Brihat Chakramarda may be found in a commentary of the Madanapala Nighantu, an Ayurvedic lexicon. While discussing the significance of the herb Chakramarda (*Cassia tora* Linn), the commentator of this nighantu pointed out that there is another herb, *Cassia alata* Linn, which is also regarded as Brihat Chakramarda and it possesses significant antifungal activity.<sup>[2]</sup>

Dadrughna is another name for Brihat Chakramarda and in Ayurveda, the term "Dadru" describes the skin condition ringworm. Leaves of Dadrughna being the used parts, are said to be sour, cure vata dosha, itching, cough, asthma, ringworm, other skin diseases, vermicide and also useful in snake bites. Internally the leaves and flowers are prescribed like a tonic.<sup>[3]</sup>

Ayurveda is well known for its holistic approach of diseases with promising positive effects by targeting the root causes especially chronic and infectious diseases. Numerous fungal outbreaks have occurred in healthcare settings and have been a serious threat to immunocompromised hosts.<sup>[4]</sup> Nearly a billion people are estimated to have skin, nail and hair fungal infections and more than 150 million people have serious fungal diseases.<sup>[5]</sup> Ayurveda boasts numerous herbs renowned for their proven anti-fungal properties, yet there remain several plants awaiting exploration due to limited data. Among these is Brihat Chakramarda, which has demonstrated efficacy against various fungal infections in numerous research studies.

## Anti-fungal activity of *Cassia alata* Linn.

A study investigated the antifungal properties of *C. alata* leaves, specifically focusing on its efficacy against *M. furfur*. The researchers identified major compounds in ethyl acetate and n-hexane fractions of the leaves and conducted molecular docking

experiments to assess their interaction with lanosterol 14- $\alpha$  demethylase. Antifungal activity was tested using the disc diffusion technique, major compounds were identified via LC-MS/MS analysis, and molecular docking was performed using homology modeling through Swiss Models. Both ethyl acetate and n-hexane fractions exhibited antifungal activity against *M. furfur* in a concentration-dependent manner. LC-MS/MS analysis revealed five major compounds in these fractions. Molecular docking studies showed that stearidonic acid had the highest binding affinity at -7.2 kcal/mol. The findings suggest that compounds in the n-hexane fraction possess antifungal activity against *M. furfur*, as supported by both experimental and computational analyses.<sup>[6]</sup>

An article explores the potential of using a traditional treatment, *Senna alata* leaf decoction, for tinea imbricata, a rare fungal infection caused by *Trichophyton concentricum*. This condition is particularly prevalent among the T'boli tribe in the Southern Philippines, where access to antifungal medications is often limited, posing a significant public health concern. In this study, patients with tinea imbricata were instructed to apply *Senna alata* leaf decoction for a duration of four weeks. The researchers assessed the efficacy of the treatment by evaluating various parameters before and after the intervention. The results indicated promising outcomes. After the four-week treatment period, a significant decrease in pruritus (itchiness) was observed in 95% of the patients, with a mean reduction of 4.05 on the pruritus visual analogue scale (VAS). Additionally, there was a notable improvement in disease severity scores, as evaluated by two independent assessors based on photographs. The overall agreement between the assessors was considered 'moderate,' indicating a substantial degree of consensus regarding the treatment's effectiveness in reducing disease severity. Furthermore, 40% of the patients showed negative results on potassium hydroxide (KOH) tests for fungal presence after the treatment period, suggesting a reduction or elimination of the fungal infection. Importantly, no adverse drug events were reported among the participants, indicating the safety of *Senna alata* leaf decoction as a treatment option for tinea imbricata.<sup>[7]</sup>

This study aimed to assess the effectiveness and safety of *Cassia alata* in treating fungal infections. Researchers collected, dried, and extracted the plant's leaves using water and 95% ethanol. These extracts were then tested against five different clinical isolates of pathogenic fungi to evaluate their antifungal properties. The findings of the study revealed a notable dose-dependent antifungal activity exhibited by both the aqueous and ethanolic leaf extracts across the five selected clinical isolates of pathogenic fungi. Particularly noteworthy was the superior performance of these extracts in inhibiting the growth of *Candida albicans*, *Microsporum canis*, and *Trichophyton mentagrophyte* compared to the positive control, ketoconazole 200 mg, as indicated by statistical significance ( $p < 0.05$ ). Further analysis determined the minimum inhibitory concentrations (MIC) of the *Cassia alata* leaf extracts for each fungus. The MIC of the water leaf extract ranged from 26.90 mg to 32.40 mg for *Candida albicans*, *Aspergillus niger*, *Penicillium notatum*, *Microsporum canis*, and *Trichophyton mentagrophytes*, respectively. Meanwhile, the ethanol leaf extract exhibited even lower MIC values, ranging from 3.50 mg to 12.60 mg for the same fungal strains. These findings underscore the potent antifungal properties of *Cassia alata* against various human pathogenic fungi. Such results substantiate the traditional use of this plant in folk medicine for managing fungal diseases and highlight its potential as a natural alternative or adjunct therapy in combating fungal infections.<sup>[8]</sup>

The agar cup method was utilized to screen for antifungal activity. As test organisms, *Trichophyton mentagrophytes* and *Candida albicans* were employed, with clotrimazole serving as the positive control. The extract with the highest level of activity against *Trichophyton mentagrophytes* was CHCl<sub>3</sub>, while it exhibited no effect against *Candida albicans*. The hexane and EtOAc extracts showed activity against both organisms, with EtOAc being more active against *Candida albicans*.<sup>[9]</sup>

An article explores the use of *Senna alata* leaf powder to derive five different extracts containing anthraquinone compounds in various forms. These include anthraquinone aglycone extract, anthraquinone glycoside extract, anthraquinone aglycones from glycosidic fraction, crude ethanol extract, and anthraquinone aglycone from crude ethanol extract. These extracts were tested against dermatophytes, including *Trichophyton rubrum*, *T. mentagrophytes*, *Epidermophyton floccosum*, and *Microsporum gypseum*, using diffusion and broth dilution techniques to determine their antifungal activity. Thin layer chromatography was utilized to identify the chemical constituents of each extract. The study concludes that anthraquinone aglycones from the glycosidic fraction exhibit the most potent in vitro antifungal activity compared to the other extracts, both qualitatively and quantitatively.<sup>[10]</sup>

By using the agar diffusion method, the antifungal activity of the aqueous flower extract of *Cassia alata* Linn. was examined against three different groups of fungi: *Aspergillus flavus* (NCBT 101) and *A. parasiticus* (NCBT 128); plant pathogenic fungi, *Fusarium oxysporum* (NCBT 156) and *Helminthosporium oryzae* (NCBT 165); and human pathogenic fungi, *Candida albicans* (NCBT 140) and *Microsporum audouinii* (NCBT 173). For fungal strains that produce aflatoxin, growth was completely inhibited (100%) at doses of 10 and 15 mg/ml. Conversely, complete suppression for human and plant pathogenic fungi was achieved at a dosage of 15 mg/ml. For these fungi, the extract's minimum inhibitory concentration (MIC) ranged from 5.75 to 8.00 mg/ml. Thus, aqueous flower extract of *C. alata* can be used as a potential antifungal agent for these three varied groups of fungi.<sup>[11]</sup>

## CONCLUSION

Brihat Chakramarda (*Cassia alata* Linn.), known as Ringworm senna, holds promising potential in treating fungal infections, particularly ringworm, as per both traditional Ayurvedic knowledge and modern scientific research. Despite its limited mention in classical texts, its antifungal properties have garnered attention. By synthesizing traditional wisdom with contemporary evidence, this review underscores the therapeutic relevance of Brihat Chakramarda and advocates for further research to explore its clinical applications in combating fungal infections across various healthcare practices.

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