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"Ayurvedic Perspective And Therapeutic Role Of Classical Medicines In Dengue Fever: A Critical Review"

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ABSTRACT

Dengue fever (DF) is a mosquito-borne viral disease caused by the dengue virus, which belongs to the genus Flavivirus. It is a major global public health concern, particularly in tropical and subtropical regions. According to data reported by World Health Organization, an estimated 100–400 million dengue infections occur annually worldwide, placing nearly half of the global population at risk. Dengue fever is endemic in India and several countries of Southeast Asia. The disease is transmitted primarily through the bite of infected female Aedes aegypti mosquitoes, which are active mainly during daytime.Based on the similarity in clinical presentation, dengue fever can be correlated with Dandaka Jwara or Sannipataja Jwara as described in Ayurvedic literature. In a large proportion of infected individuals, dengue remains asymptomatic or presents with mild symptoms, which usually subside spontaneously within 7–14 days. However, symptomatic cases commonly manifest with acute fever, severe headache, retro-orbital pain, backache, arthralgia, generalized body pain, nausea, vomiting, restlessness, and in severe cases, hemorrhagic manifestations and intense abdominal pain. Individuals experiencing a secondary dengue infection are at a higher risk of developing severe dengue, often necessitating hospitalization and intensive medical care.At present, there is no specific antiviral therapy available for dengue fever in modern medicine, and management is largely supportive and symptomatic. Prevention primarily focuses on avoiding mosquito bites and controlling mosquito breeding, especially during daylight hours. Ayurveda describes several medicinal plants and formulations that are traditionally used in the management of febrile conditions and for enhancing host immunity. Drugs such as Carica papaya Linn. and Curcuma longa Linn. are widely reported for their potential role in improving platelet count, modulating immune responses, and alleviating fever.The present study aims to comprehensively review dengue virus infection with respect to its etiology, clinical features, diagnosis, and management, with a special emphasis on Ayurvedic medicines. This review critically evaluates classical Ayurvedic references and contemporary scientific evidence to explore the therapeutic potential of Ayurvedic interventions in dengue fever....

Keywords: Dengue fever (DF), Aedes aegypti, Carica papaya, Endemic, Ayurveda

1. INTRODUCTION

Dengue fever approximately affect 50-100 million population annually, out of them half of million required hospitalisation and around 20,000 people lost their lives (1). Some studies assumed that around 390 million dengue infections left unreported (2,3) . In Delhi in 2015, over 1500 cases of DF detected. Under National vector borne disease Control Program they found 1,09,676 dengue cases,with 187 deaths (4,5). Dengue fever has been classified by WHO in 1997 as Dengue hemorrhagic fever (DHF), Non-speicific fever and dengue fever (DF) (6). Life cycle of dengue mosquito as per CDC depicted in Table no.1.

Table 1. Life Cycle of Dengue mosquitoes Aedes aegypti

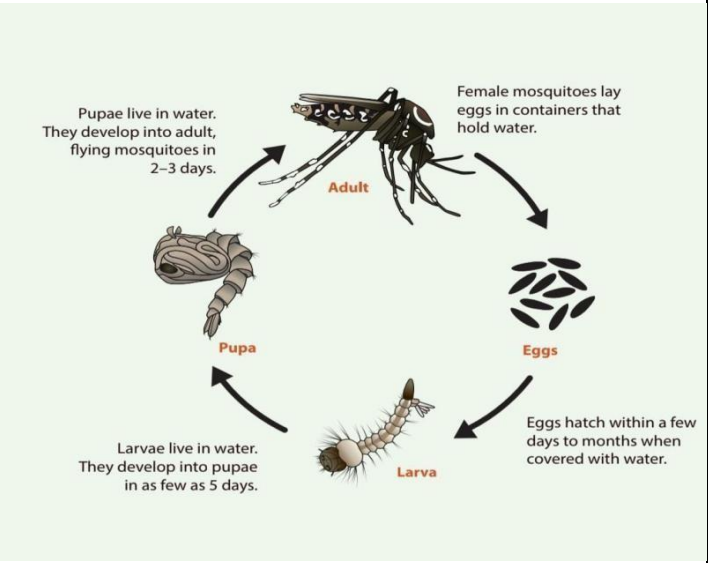
Female Aedes mosquitoes lays eggs in available conatiners containing water on its inner walls

Larvae emerges from eggs whenever water falls over egg as in case of rainy season etc., and remains in the water.

Larvae converted into pupae form in around 5 days.

Pupae will take 2-3 days to develop into adult flying mosquitoes.

These mosquitoes need human and animal blood to produce eggs.



It takes about 7-10 days to develop adult moquito from egg

Pic Courtesy- U.S. Department of Health and human services (CDC).

The dengue cycle includes 4 Phases in first phase mosquito infection by human and in second phase extrinsic incubation took place in the mosquito, then in human body intrinsic incubation phase. (7).

Dengue mosquito bites person who is infected and in viraemic phase of dengue then the mosquito become infectious vector. Initially in intrinsic phase gut cells of mosquito contaminated by Dengue virus which then involves salivary galnd and other tissues. This infected mosquito can infect multiple people at the same time (8). It took around 4-7 days for the symptoms to appear in person after getting the mosquito bite. An infected host even if in asymtomatic stage can still can transfer dengue virus to the aedes Aegypti mosquitos belonging to falvivirus genus (9).

Epidemiology

In india first reported area infected by dengue virus was calcutta in 6th decade of 20th centuary. Other part of india which was affected by DHF noted in 1988 (10). The Dengue virus contaminated the Australian continent in 1873 (11) (12).

Clinical Features of Dengue fever

The dengue clinical fetures varies according to severity. Asymptomatic dengue fever infection are common. the clinical fearures are depicted (13) in Table.2.

Table 2. Clinical Features of Dengue Fever [13]

Stage	Clinical Features
Prodromal Phase	Initial malaise and headache lasting for approximately 1–2 days.
Acute Onset Phase	Sudden onset of high-grade fever associated with severe headache, retro-orbital pain (pain on eye movement), generalized body ache (“breakbone fever”), anorexia, nausea, vomiting, relative tachycardia, conjunctival/scleral injection, fatigue, and depressive mood.
Fever Pattern	Fever is typically continuous or exhibits a characteristic “saddle-back” pattern, with a brief defervescence around the 4th or 5th day, followed by recurrence. The total duration of fever usually lasts 7–8 days.
Rash	Appears within 1–2 days as a transient macular rash, followed by a maculopapular rash between the 3rd and

Stage	Clinical Features
	5th day. The rash primarily involves the trunk and spreads centrifugally, usually sparing the palms and soles.

Investigations

WHO had issued severity based sypmtoms guidelines (14). If a people travelled to dengue infected locality, and aving fever with any of 2 symptoms or signs out of nausea, flush, leukopenia, pain, vomiting, and also has positive Tourniquet test which confirmed the Dengue virus infection. Laboratory investigations like rapid reduction in platelet count and increase in hematocrit indicated initial stage of dengue virus infection (15). In later stage Dengue is life threatening condition with symptoms like severe hemorrhage with heart, liver, eye and central nervous system imapairment (Tang and Ooi, 2012)(15). DF infection is confirm by investigations like NS1 antigen capture test, RT PCR test, IgA, IgG or IgM detection and MAC ELISA, etc. (16). If Diagnosis is made at an early stage then patients can recover in an early time in 1-2 weeks from the date of infection (17).

Dengue management in Allopathic system

There is no known speicific treament found for Dengue fever. Paracetamol advocated for pain. Aspirin should be avoided (Nicholas et al., 2006)(13). No speicific antiviral drug available for Dengue virus (17). To maintain hydration is the main remedy for DF for which WHO has approved some guidelines (19).

MATERIALS AND METHODS

This critical review article is an attempt to evaluate present evidences and researches on the efficacy of Ayurvedic treatment of DF. In order to do literature review we gone through the researches database available on Web of science, Scopus, Pubmed, Google scholar, Elsevier.

MODE OF ACTION: AYURVEDIC AND PHARMACOLOGICAL PERSPECTIVE

From an Ayurvedic standpoint, most medicines employed in the management of dengue fever possess Tikta (bitter) and Kashaya (astringent) rasa, along with Laghu (light) and Ruksha (dry) guna, and predominantly Ushna virya. These properties play a crucial role in correcting Agni dysfunction and eliminating Ama, which is considered a primary pathological factor in Jwara. Tikta rasa is specifically indicated in Pitta-dominant and Sannipataja Jwara due to its ability to pacify Pitta, purify Rakta, and reduce inflammation, while Kashaya rasa helps in Rakta-stambhana, thereby preventing bleeding manifestations observed in severe dengue.

Laghu and Ruksha guna facilitate srotoshodhana (clearing of microchannels), reduce heaviness, and alleviate systemic symptoms such as body ache and lethargy. Ushna virya supports Agni deepana and enhances metabolic processes, which is essential for recovery from febrile illness. Collectively, these properties contribute to dosha shamana, particularly of Pitta and Vata, and restoration of physiological balance.

From a pharmacological perspective, Ayurvedic drugs traditionally used in dengue management exhibit multiple bioactive effects. Medicinal plants such as Tinospora cordifolia and Curcuma longa have been shown to possess antipyretic and anti-inflammatory properties, which help reduce fever and inflammatory mediators. Their immunomodulatory action enhances innate and adaptive immune responses, potentially improving viral clearance. Antioxidant properties counteract oxidative stress induced by viral infection, while hematopoietic effects, especially attributed to Carica papaya, support platelet regeneration and stabilization of hematological parameters. Thus, modern pharmacological findings provide a scientific rationale for the classical Ayurvedic use of these drugs in dengue fever.

REVIEW OF EXPERIMENTAL AND CLINICAL EVIDENCE

Experimental studies conducted on various Ayurvedic medicinal plants have demonstrated significant immunomodulatory, antipyretic, and anti-inflammatory activities. Preclinical studies on Guduchi have shown enhancement of macrophage function, modulation of cytokine responses, and protection against immune suppression. Similarly, Haridra has been reported to inhibit inflammatory pathways and oxidative damage, which are central to dengue pathogenesis.

Clinical observations and small-scale clinical studies have reported beneficial outcomes with the use of papaya leaf extract, particularly in improving platelet count, reducing the duration of fever, and accelerating symptomatic recovery in dengue patients. Some observational studies and pilot trials involving classical formulations such as Sudarshana Churna and Guduchi Ghana Vati have also indicated improvement in clinical parameters without serious adverse effects.

However, most available clinical evidence is limited by small sample size, lack of randomization, absence of blinding, and short follow-up periods. The heterogeneity in study designs and outcome measures makes it difficult to draw definitive conclusions regarding efficacy. Hence, while preliminary evidence is encouraging, it remains insufficient for establishing standardized treatment guidelines.

CRITICAL ANALYSIS

Although Ayurvedic medicines demonstrate promising supportive benefits in dengue fever, several limitations must be critically acknowledged. One major challenge is the lack of standardization in raw drug quality, formulation composition, dosage forms, and treatment protocols. Variability in plant sources, methods of preparation, and storage conditions can significantly influence therapeutic outcomes.

Another important concern is the insufficient availability of high-quality clinical trials, particularly randomized controlled trials with adequate sample size and methodological rigor. The absence of robust evidence limits the acceptance of Ayurvedic interventions in mainstream clinical practice.

Safety considerations are especially important in severe dengue and hemorrhagic stages, where inappropriate drug selection or dosing may aggravate bleeding risk or interfere with supportive medical management. Therefore, Ayurvedic medicines should be administered only under professional supervision, preferably as an adjunct to standard supportive care.

Overall, while Ayurveda offers a holistic and biologically plausible approach to dengue fever management, evidence-based validation, standardization, and safety assessment are essential before its widespread clinical application. Integrative research models may help bridge the gap between classical knowledge and modern scientific expectations.

2. DISCUSSION

Ayurveda employs several **single herbs** possessing *Jwaraghna*, *Rasayana*, *Rakta-prasadana*, *Deepana–Pachana*, and *Ojovardhaka* properties, which are beneficial in the supportive management of dengue fever. These herbs primarily act by correcting ***Agni***, eliminating ***Ama,*** pacifying ***Pitta–Vata,*** improving **platelet count**, and enhancing **host immunity**.

AYURVEDIC HERBS USED IN THE TREATMENT OF DF

Carica papaya (Papita)

Carica Papaya hindi name *Papita*, and it is belonging to *Canicaceae* family. *In Ayurveda C.Papaya Leaf* extracts was advocated for incraesing blood volume (20). *C. Papaya* leaves are known for the treatment of DF, Malaria, Bronchitis, cough etc. its main effects is to increase platelets hence, normalise clotting time and prove to be beneficial for liver also (21). Green, brown and yellow leaves of *papita* are known in current time, out of these three green leave found to be have better nutritional value than remaining two (22). *Papita* leave extract found to be having plasma maintaing actions as well as platelets protective action in an infected people by dengue virus (Lim et al.,2021)(23). In one study conducted in 228 patients of DF and DHF, they found that p*apaya L*. leaves extracts increases the platelet count significantly (24). In one another clinical trial conducted on 51 dengue confirmed patients whose platelets counts were less then 30,000 established antiviral effects of papaya leaf extract (25).

Curcuma longa L. (Haldi)

Haldi belongs to *Zingiberaceae* family. *Turmeric* is known as *Curcuma longa L.* in Asian countries. In India more than 40 types of varities of Turmeric cultivated (Prasad et al., 2011)(26). *Curcuma longa* rhizomes part dried and turned into powdered form found to antioxidant, anticancer as well as anti-inflammatory effects (Sharififi-Rad et al., 2020)(27). *Haldi* antiviral effects was also examined in vivo and in vitro methods in which *Curcuma Longa L.* extract shown anti Dengue virus activity on human liver cells as on mice cells (Lim et al., 2021)(23).

Momordica charantia L. (Karela)

Momordica charantia L., is called as kerala in hindi, and bitter gourd in english and belongs to Curcurbitaceae family (Jia et al., 2017)(28) Compounds present in *Karela* like Flavanoids, cucurbitacin, isoflavones etc. make it bitter (Tungmunnithum et al., 2018)(29). *Karela* exhibits larvicidal property when its flowers and fruits mix in the hexane, methy acetate and metahnol. The finding confirm that methanol extract was effective aginst dengue virus activity (28,30).

Cinnamomum osmophloeum (Tejpatta)

Cinnamomum osmophloeum is also known as indigenous cinnamon *,Tejpatta* in hindi and in english it is known as Bay leaf. It belongs to *Lauraceae family* (31). *C. osmophloeum* leaf conatining oils such as cinnamyl acetate, cinnamaldehyde, anethole and found larvicidal action against Dengue mosquito (32).

Psidium guajava L. (*Amrood)*

Psidium guajava L. family is *Myrtaceae,* its english name is *guava* and in hindi known as *Amrod*. In a research found that when *guava* leaves boiled in water increases platelet count (33). *P. guajava L.* shows antiviral due to increased in immunity that leads into increases in platelet count in human body (34.). In a study conducted in vivo and in silico by Trujillo et al found *gallic acid, catechin* etc., in ethanolic extract of *P. guajava L.* that proves to be effective against Dengue virus (35).

Scutellaria baicalensis (Baikal)

S. Baicalensis, family is Lamiaceae. In hindi it is known as *Baikul and in english better known as Chinese skullcap,* and known to found in indian region(36). In one study it is found that *S. baicalensis* root extract shows antiviral action against Dengue virus (37) (38).

Azadirachta indica A.Juss. (*Neem)*

Azadirachta Indica, family is *Meliaceae,* it known by the name of neem in india. *Neem* used to be known for antifingal, antibacterial, anti-inflammatory and anti tumour activity (39). In a stuy, it was found that *A. Indica* leaf extract works against Dengue virus and a viral haemorrhagic fever with ebola virus (40). In in vitro Dwivedi at el. found antiviral effects of *Neem* against Dengue virus and it is postulated that *A. indica A. Juss* proved to be beneficial as an effective against DF (41). In one study Rasool et al. found that *Neem* leaves has larvicidal effect against DF (42). Rao et al postulated that ligands such as Gedunin and Pongamol works against DF and explanied it as useful to develop a cure (43). Rao, V.B., Yeturu, K., 2020. In terms of newer potential ligands (Gedunin and Pongamol) against dengue are signifificant as this provides a basis for experimentally verifying and extending the same to develop a cure (43).

Eucalyptus citriodora Hook (*Safeda)*

E.citriodora hook known as *safeda* in hindi and lemon scented gum in english, it is a very long woody tree. Eucalyptus family is *Myrtaceae*. It chemical constituents are beta citronellal, linalool, citronella etc. (44). *Safeda* has showned repellent as well as oviposition reactions against *A. aegypti* (44). In one study conducted by Manh et al., found that *E. citriodora* hook has *A. aegypt* larvicidal activity (45).

Andrographis paniculata Nees (*Kalmegh)*

Andrographis paniculata Nees belongs to *Acanthaceae* family, It is menationed as *Kalmegh* in sanskriti. and in english, it is known as the king of bitters. One study it was found *Kalmegh* can decreases 75% dengue viral load and its ethanolic extract is useful against Dengue virus (46),(47). In one study by Adiguna et al. they found that it blocks the Dengue virus entry and viral replication (Adiguna et al., 2021)(48).

Phytochemicals used in dengue medication

In india since ancient times curing diseases by using natural resources containing phytochemical consistuents of plant (49) . Plants derived phytochemicals plays an important role against infection and diseases by strengthening our immuninty (50) (51). Plants chemicals consituents, body parts used depicted in Table.3

Table.3 Herbal or Ayurvedic medicines for Dengue fever

Name of the plant	Parts used	Family	Phytochemical
Carica Papaya L.(Papita) (52)	Leaf	Caricacae	Papain and Quercetin
Acorus Calamus (Sweet flag)(53)	Root	Acoraceae	Tatanan A
Azarirachta indica A. Juss (Neem) (41)	Leaf		Azarirachtin
Curcuma longa L. (Turmeric, Haldi (54)	Rhizome	Zingiberaceae	Curcumin
Momordica Charantia L. (Karela) (56)	Fruit	Cucurbitaceae	Curcurbitane-Mormorficin
Psidium guajava L. (Amrood) (56)	Leaf	Myrtaceael	Ethylacetate

3. CONCLUSION

Dengue is a life threatening disease caused by *Aedes mosquitos* which belongs to *Flavivirus* family. Dengue fever symtoms can be from asymtomatic in few cases to life threatening in other. Now it has turned into global public hazard. despite multiple development there is no specific cure for DF. Ayurvedic medicines may be consider as a alternative treatment for dengue DF management (57). V arious ayurvedic medicines on whom, in vivo and in vitro anti dengue effects have been

established. This review was an attempt to put light on Ayurvedic medicines on whom multiple experiments have been done. There are multiple options are available to explore in the field of phytochemical study on ayurvedic drugs for dengue cures in future.

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