



**TRADITIONAL USES, MEDICINAL PROPERTIES AND
PHYTOCONSTITUENTS OF SOME INDIAN *FICUS* SPECIES: A
REVIEW**

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ABSTRACT

The utilization of plant-based methods remains crucial for maintaining health, with various civilizations extensively documenting their use. Tropical Indian species of the *Ficus* genus are among the earliest fruit trees that have known to have various traditional and therapeutical applications. *Ficus* species include many phytochemicals that have demonstrated a variety of therapeutic applications and are frequently used as traditional medicine. For example: *Ficus religiosa* commonly known as the peepal tree, *Ficus benghalensis* is the Indian banyan etc. are traditionally used for various health ailments such as burns, wounds, skin diseases etc. The aim of this review is to give the comprehensive information about the traditional applications, phytochemical constituents and pharmacological effects associated with some Indian *Ficus* species, including *Ficus drupacea*, *Ficus rumphii*, *Ficus hispida*, *Ficus semicordata*, *Ficus subincisa* etc. and highlighting their potential as sources for new therapeutic compounds.

Keywords: *Ficus*, Traditional uses, Phytochemicals, Biological activity, Phytopharmacology, Medicinal properties

INTRODUCTION

Ficus is a member of the Moraceae family and referred as Fig (mulberry family). It is regarded as a keystone plant in tropical rain

forests. With about 750 species, *Ficus* is one of the largest angiosperm genera. Primarily in subtropical and tropical areas, the genus

is found all over the world [1]. Nearly 500 species in the world, are concentrated in the Asian-Australian region. This genus is found all over the region of India i.e., from South to North, and up to the Himalaya at an elevation of roughly 2,000 m [2]. India is referred to as the botanical garden of the world and contains the largest resources of medicinal herbs. Various parts of the plant, such as leaves, bark, roots, branches, fruits, endocarp, fiber, seed coat, sap, spadix, and heartwoods, serve as components in traditional medicinal practices [3]. Indian herbal remedies making use of *Ficus* species have served as a significant source of medications for the treatment and prevention of numerous diseases over the years [4]. Uttarakhand is the hub of plants having a wide range of *Ficus* species. *Ficus* trees are traditionally conserved in Uttarakhand because they provide food to a variety of bat primates, birds, cattle, and other animals and used therapeutically across the area, especially in the rural areas with fewer health facilities. Hindu and Buddhist religions are culturally tied with these plants, so these are being planted in religious places and as greenery. Fruits of *Ficus* species are nourishing, energizing, healthy, and have ethnomedical benefits. Nutrients, vitamins, minerals, water, and fats are abundant in fig species. Figs are a good source of fiber and calcium [5]. Triterpenes, flavonoids, polyphenols,

alkaloids, sterols, coumarins, and other secondary metabolites are present in the medicinal plants of the genus *Ficus*. These phytochemicals are responsible for various pharmacological activities like anti-diabetic, anti-microbial, analgesic activity etc. As a result, the *Ficus* genus is significant from an ethnobotanical perspective and is used by locals and tribals in various parts of India as traditional medicine. According to research, *Ficus auriculata*, a member of the *Ficus* genus, shows a variety of traditional medicinal applications. Its young, purple leaves and fresh, mature fruits are both utilized as animal feed. All parts of the *Ficus racemosa* plant, also known as "gular," are considered medicinally significant in Ayurveda and have been widely used to treat biliary problems, jaundice, dysentery, diabetes, diarrhea, and inflammatory illnesses [6].

This review compiles the various information about the pharmacology, phytoconstituents, and ethnomedicinal uses of some Indian *Ficus* species for example: *Ficus drupacea*, *Ficus rumphii*, *Ficus hispida*, *Ficus semicordata*, *Ficus subincisa* and some other species found in the literature.

MATERIALS AND METHODS

A thorough review of the recent literature has been conducted by gathering information from available literature (Academic Journals, Google Scholar,

PubMed, Scopus, Science Direct, Web of Science, and library searches) on various Indian *Ficus* species.

TRADITIONAL USES

The use of *Ficus* species as ethnomedicine has been observed since long time in the treatment of various ailments. Various parts of plants such as leaves, fruits, bark, latex, stem, root etc. are used medicinally in the traditional system of medicine in India [5]. The notable use of the mentioned Indian *Ficus* species in treatment of various ailments includes rheumatism, ulcers,

diabetes, gonorrhoea, urinary tract infection, asthma, vaginal disorders, diarrhea, vomiting, skin infections, constipation, obesity, flu, fever etc. Example of traditional uses of *Ficus* species are root powder of *Ficus drupacea* is applied externally to cure skin infections [3], Fruit juice of *Ficus rumphii* is used to treat asthma [6], Leaves paste of *Ficus auriculata* is applied to the wounds [4], etc. **Table 1** provides a summary reporting various Indian species of *Ficus* along with their traditional uses.

Table 1: Traditional Uses of Indian *Ficus* Species

S. No.	Name of the plant species	Common Names	Plant parts used	Ailments Treated	References
1.	<i>Ficus auriculata</i>	Timla	Fruits, leaves, stem, bark, roots, latex	Dysentery, wounds, diarrhea, cholera and vomiting.	4,11,12,15,18,21
2.	<i>Ficus benghalensis</i>	Indian Banyan, Banyan fig, Bargad	Leaves, aerial roots, seeds, fruits, roots, bark, latex, buds	Ulcers, gonorrhoea, vomiting, astringent, diarrhea, diabetes, rheumatism and other inflammatory diseases.	11,18,35,41, 47,55,60
3.	<i>Ficus carica</i>	The common fig	Leaves, fruits, bark, latex	Bone treatment, constipation, vision problems, Jaundice, leukoderma, appetite, bronchial problems and cardiovascular disorders.	3,8,19,48,50,60
4.	<i>Ficus dalhousie</i>	Kallaal (Malyalam), Pei-aa	Fruits, leaves, bark, stem, flower	Heart diseases, liver and skin disorders, leprosy. Cardio tonic.	22,25,50
5.	<i>Ficus drupacea</i>	Brown Woolly fig	Root	Root powder is applied externally to cure skin infections.	3,18
6.	<i>Ficus hispida</i>	Hairy fig, opposite leaf fig	Leaves, fruits, roots	Earache, milk secretion in mothers, anti-diarrheal, antidiabetic and cardioprotective. A mixture of honey and the juice of fruits is an antihemorrhagic.	6,7,18,55,60,61
7.	<i>Ficus krishnae</i>	Makhan Katori	Leaves, stem, bark, latex, aerial root	Diabetes, astringent, ulcers, vomiting, vaginal complaints, fever, inflammations, leprosy, piles, gonorrhoea, urinary tract infection, helminthiasis, microbial infection, inflammation of liver etc.	1,3
8.	<i>Ficus palmata</i>	Punjab fig, Bedu	Latex, fruit, sap, stem	Bleeding wound, laxative, constipation, bladder, gastrointestinal, hypoglycemic, antitumor, anti-ulcer, anti-diabetic, lipid lowering and antifungal activities.	18,21,34,53, 58,60,68,69,70
9.	<i>Ficus racemosa</i>	Cluster fig, Gular	Leaves, fruit, bark, latex, roots, seeds, whole plant	Anti-diuretic, astringent, callus healing, burning sensation, obesity, vaginal disorders, diarrhea, bark ash mixed with honey used in high cough, Asthma and piles, burning sensation, fatigue.	5,9,11,15,17, 49,52,55,62
10.	<i>Ficus religiosa</i>	Peepal	Leaves, bark, fruit, seeds,	Purgative, wounds, skin diseases, asthma, anti-inflammatory, laxative, digestive, gum	6,13,15,16,24,39, 48,54,55,63,67

			root, latex, tender shoots, whole plant	diseases, glandular swellings of neck, constipation, anti-diuretic property, Leaves are also used as fodder, bark as astringent, seeds are cooling, laxative, Diabetes, liver diseases, migraine, epilepsy, etc.	
11.	<i>Ficus rumphii</i>	Mock Bodh tree, Mock Peepul tree	Leaves, fruits	Leaves as fodder and treating mouth diseases of cattle. Fruit juice is medicinal in asthma and prescribed with black-pepper, turmeric and ghee.	3,6,18,50
12.	<i>Ficus semicordata</i>	Bhui dumri in Odisha, Khinwa	Leaves, fruits, roots, bark, latex, seeds, twig, aerial parts	Jaundice, stomach disorders, wound healing, scabies, leprosy, liver ailment, skin diseases, antioxidant and anti-bacterial. Fruit and root juice is used in Abdominal diseases, ulcer, diabetes, hepatitis, bladder and liver ailments, headache, abdominal diseases, ulcer, toothache, fever, earache.	1,3,18,28,30,31, 50,55
13.	<i>Ficus subincisa</i>	Umaru	Roots, latex, leaves, fruits	Diarrhea, Leaves and branches used as fodder and fruits are edible.	3,11

PHARMACOLOGICAL ACTIVITIES

Pharmacological studies have focused on the *Ficus* genus, exploring its diverse ethnomedicinal applications. Literature reveals that this genus demonstrates a wide range of pharmacological effects including antibacterial, antiviral, anthelmintic, anti-inflammatory, antioxidant, anti-allergy, anti-tumor, cytotoxic properties, etc. Some of these are discussed below and **Table 2** presents a summary of the pharmacological activities of this *Ficus* genus.

Anti-inflammatory and analgesic activity

The body's most crucial natural defense mechanism against aggression caused by inflammatory agents like infections, toxins, or physical injury is inflammation. Various parts of plants of *Ficus* genus display anti-inflammatory activity on acute and chronic inflammation in animal models. Stigmasterol isolated from most of the *Ficus* species exhibits significant anti-inflammatory effects in animal models [59].

Anti-cancer activity

The anti-cancer activity of *Ficus* species was examined by making use of in-vitro and in-vivo models. Generally, leaves and fruits of *Ficus* species are examined for this anti-cancer activity [17]. For example: 80% ethanolic extract of *Ficus auriculata* leaves was screened for cytotoxic activity against human hepatocellular carcinoma (HepG2) [70].

Anti-diabetic activity

The anti-diabetic activity of *Ficus* species has been shown by many studies. An oral aqueous extract of *Ficus religiosa* leaves in doses of 100 and 200 mg/kg was shown in a recent study to lower fasting blood glucose in streptozotocin (STZ)-induced type 2 diabetic mice. This extract contains tannins, furanocoumarin derivatives such bergapten and bergaptol, phytosterols, flavonoids, and phytosterols [59].

Antioxidant activity

The antioxidant activity of the *Ficus* species extract was estimated using different in vitro assays. The values of total antioxidant activity (TAA) were evaluated by measuring the ABTS activity of different extracts of *Ficus* species [32,59].

Other activities

Some of the other activities reported on the *Ficus* species includes anti-ulcer activity on *Ficus religiosa* [55], leaves of *Ficus carica* is found to have anti-fungal [17], anti-bacterial [17], anti-microbial activity [3]. Rest of the activities is reported in Table 2 which lists the various pharmacological potential of Indian *Ficus* species.

Table 2: Pharmacological Potential of Indian *Ficus* Species

S. No.	Biological Activity	Name of Plant Species	Plant Part Used	References
1.	Analgesic activity	<i>Ficus bengalensis</i> <i>Ficus religiosa</i> <i>Ficus racemosa</i> <i>Ficus dalhousie</i>	Stem bark, Leaves Stem bark Bark, leaves, root Leaves	20, 24, 60, 67-69 22, 25, 46, 71 17, 26, 35, 41, 49, 52, 62 5, 9
2.	Anthelmintic activity	<i>Ficus bengalensis</i> <i>Ficus racemosa</i> <i>Ficus religiosa</i> <i>Ficus dalhousie</i> <i>Ficus carica</i>	Roots Bark Bark Leaves Leaves	20, 26, 35, 41, 47 9, 20, 52, 62 22, 25 16, 35, 39 8, 19
3.	Anti-asthmatic activity	<i>Ficus religiosa</i> <i>Ficus racemosa</i>	Bark Stem	17 39, 67
4.	Anti-bacterial activity	<i>Ficus carica</i> <i>Ficus religiosa</i> <i>Ficus bengalensis</i> <i>Ficus racemosa</i> <i>Ficus auriculata</i> <i>Ficus palmata</i> <i>Ficus krishnae</i>	Latex, leaves Leaves, fruits, bark Fruit Bark, roots Leaves Leaves, fruit Bark, leaves	19, 20, 60 16, 47 41, 60 5, 9, 17, 49, 52, 62 4 34 33
5.	Anti-cancer activity	<i>Ficus racemosa</i> <i>Ficus carica</i> <i>Ficus bengalensis</i> <i>Ficus religiosa</i> <i>Ficus auriculata</i>	Aerial parts Leaves, Fruit Fruit Fruit Leaves	9, 20, 35, 52 8, 19, 20, 32 20, 41 35, 54 4
6.	Anti-convulsant activity	<i>Ficus religiosa</i> <i>Ficus Dalhousie</i> <i>Ficus hispida</i>	Fruit, leaves, aerial roots Roots Leaves	24, 60, 68,69 16, 25, 39, 67 7, 61
7.	Anti-diabetic activity	<i>Ficus bengalensis</i> <i>Ficus carica</i> <i>Ficus religiosa</i> <i>Ficus racemosa</i> <i>Ficus hispida</i> <i>Ficus Dalhousie</i> <i>Ficus auriculata</i> <i>Ficus subincisa</i> <i>Ficus semicordata</i>	Bark, Aerial parts, Fruit Leaves, fruit Bark root, leaves Stem bark, fruit Bark Leaves Fruits Fruits, bark Leaves	20, 41, 47, 60 8, 19, 24 16, 35, 60, 67-69 5, 17, 35, 49, 52, 60, 62 7, 60, 61 22, 25 4 64-66 40
8.	Anti-diarrheal activity	<i>Ficus bengalensis</i> <i>Ficus racemosa</i> <i>Ficus hispida</i> <i>Ficus dalhousie</i>	Hanging roots, bark Bark, leaves Leaves Leaves	20, 26, 41, 47, 26 5, 9, 17, 60, 62 7, 60-61 57
9.	Anti-fungal activity	<i>Ficus carica</i> <i>Ficus bengalensis</i> <i>Ficus racemosa</i> <i>Ficus auriculata</i> <i>Ficus palmata</i> <i>Ficus semicordata</i>	Latex Leaves, Aerial roots Leaves Leaves, fruit Bark Leaves, bark, fruit	20 26, 47 5, 9, 17, 49, 52, 62, 52 4 34 23

10.	Anti-hyperlipidemic	<i>Ficus Dalhousie</i> <i>Ficus auriculata</i> <i>Ficus hispida</i> <i>Ficus racemosa</i> <i>Ficus carica</i> <i>Ficus religiosa</i>	Stem bark, bark Leaves Leaves Fruits Leaves, root, latex Fruits	22, 25 4 61 9, 52, 62 8 16, 67
11.	Anti-inflammatory activity	<i>Ficus bengalensis</i> <i>Ficus carica</i> <i>Ficus religiosa</i> <i>Ficus racemosa</i> <i>Ficus Dalhousie</i> <i>Ficus auriculata</i> <i>Ficus hispida</i> <i>Ficus krishnae</i> <i>Ficus subincisa</i>	Bark, leaves Leaves, root, stem bark, leaves Leaves Stem bark Leaves, root Leaves Leaves Stem bark Fruit, bark	20, 26, 35, 41, 47, 60 8, 19, 60 24, 39, 60, 67-69 5, 9, 17, 49, 52, 60, 62 22, 25 4 7, 61 37 64-66
12.	Anti-microbial activity	<i>Ficus religiosa</i> <i>Ficus bengalensis</i> <i>Ficus Dalhousie</i> <i>Ficus racemosa</i> <i>Ficus krishnae</i> <i>Ficus carica</i>	Leaves, bark, fruits, stem Bark, fruit Aerial parts Latex, root Stem bark Leaves	24 35, 60, 67-69 25, 26, 47, 60 17 37 8
13.	Antioxidant activity	<i>Ficus bengalensis</i> <i>Ficus religiosa</i> <i>Ficus racemosa</i> <i>Ficus carica</i> <i>Ficus auriculata</i> <i>Ficus palmata</i> <i>Ficus krishnae</i> <i>Ficus subincisa</i> <i>Ficus semicordata</i>	Fruit, Stem, Aerial roots Roots, leaves, bark, fruit Root, stem bark Leaves, fruits Leaves, fruits, bark Fruit Leaves, stem bark Bark Leaves, fruit	20, 26, 35, 41, 47 16, 24, 67 5, 9, 17, 35, 52, 60, 62 8, 32, 35, 60 4, 60 34 33, 37 65-66 30
14.	Anti-parkinson diseases	<i>Ficus religiosa</i>	Leaves	10, 60
15.	Anti-pyretic activity	<i>Ficus bengalensis</i> <i>Ficus racemosa</i> <i>Ficus dalhousie</i> <i>Ficus carica</i> <i>Ficus hispida</i>	Bark Stem bark, latex Leaves Leaves Aerial parts	20, 26 5, 9, 17, 49, 52, 62 22, 25 8, 19 7
16.	Anti-tussive Activity	<i>Ficus racemosa</i>	Stem bark	5, 9, 49, 52, 62
17.	Anti-ulcer activity	<i>Ficus hispida</i> <i>Ficus bengalensis</i> <i>Ficus religiosa</i> <i>Ficus palmata</i> <i>Ficus racemosa</i>	Aerial parts Stem bark, leaves Latex, Seeds, Fruits Aerial parts Fruits	20 54, 60, 68-69 39, 56 34 52, 62
18.	Cytotoxic Activity	<i>Ficus religiosa</i> <i>Ficus carica</i> <i>Ficus benghalensis</i>	Leaves, bark, fruit Fruit Fruit	60 8, 60 60
19.	Gastro-protective activity	<i>Ficus dalhousie</i> <i>Ficus racemosa</i>	Roots Fruit	25 5, 9, 52
20.	Hepatoprotective activity	<i>Ficus carica</i> <i>Ficus racemosa</i> <i>Ficus Dalhousie</i> <i>Ficus auriculata</i> <i>Ficus hispida</i> <i>Ficus palmata</i> <i>Ficus semicordata</i>	Leaves Stem bark, leaves Leaves Fruits, leaves Leaves Aerial parts Leaves	8, 19, 20, 59 5, 35, 52, 62 25 4 7, 61 34 29
21.	Wound healing activity	<i>Ficus racemosa</i> <i>Ficus religiosa</i> <i>Ficus dalhousie</i> <i>Ficus hispida</i> <i>Ficus benghalensis</i>	Stem bark, root, leaves Leaves, Bark Stem bark Roots Aerial parts	9, 17, 20, 49, 62 16, 24, 54, 67-69 25 61 26

PHYTOCONSTITUENTS

Human health defects can be treated with a variety of phytochemicals that are found in

Ficus plants; these helps people to treat a variety of health ailments. The phytochemical study of *Ficus* genus led to

the isolation of variety of promising phytoconstituents, including phenols, flavonoids, sterols, alkaloids, tannins, saponin, terpenoids, fatty acids and others. These phytochemicals are present in the different parts of plants like leaves, fruits, latex, seed etc. and are responsible for the various pharmacological activities for example Luteolin (C₁₅H₁₀O₆) a flavonoid

isolated from *Ficus carica* is considered to exhibit broad-ranging anti-inflammatory benefits [3], lupeol isolated from plants may be an effective treatment for advanced tumors [19], etc. **Table 3** lists the phytochemicals isolated from the various parts of various plants of Indian *Ficus* species.

S.No.	Name of the plant species	Plant part used	Phytochemicals	References
1.	<i>Ficus auriculata</i>	Leaves and fruit, root stem	Triterpenes, stigmaterol, Furocoumarins, coumarin, β-sterol-3-O-β-D-glucopyranoside, myricetin and quercetin-3-O-β-D-glucopyranoside, Isoflavon, Lactones	4
2.	<i>Ficus benghalensis</i>	Leaves	Sterols, flavonoids, phenols, tannins, saponins.	47
		Bark	Glycoside, sterol, carbocyclic sugar.	35
		Leaves	Flavonoid, triterpenes, sterol, furocoumarin, glycoside, leucoanthocyanidins, leucoanthocyanins.	26 35
		Root	Pigments. Carbohydrates, flavonoids, amino acids, proteins, steroids, saponins and Tannins	60 41
3.	<i>Ficus carica</i>	Latex, leaves, fruit, and root	Phytosterols, anthocyanins, amino acids, organic acid, fatty acids, phenolic components, hydrocarbons, aliphatic alcohols, volatile components, coumarins.	8 19
4.	<i>Ficus dalhousie</i>	Leaves	Sitosterols, Stigmaterol and Stigmaterol-D-glucoside	25
5.	<i>Ficus hispida</i>	Bark	Sterol, triterpenes	61
		Leaves	Alkaloids	
		Stem	Alkaloids	
6.	<i>Ficus krishnae</i>	Leaves	Carbohydrate, carboxylic acid, phytol.	38
		Stem bark	Triterpenoids	
7.	<i>Ficus palmata</i>	Leaves	Flavonoids, isoflavones, β-Sitosterol and Stigmaterol	14
		Aerial Parts	Glycosides, triterpenes, furanocoumarins, flavon glycoside.	34
8.	<i>Ficus racemosa</i>	All parts	Tannins, saponins, wax triterpenes, sterols, glycoside, fat.	35
		Bark	Triterpenes, sterol.	17
		Fruit	Triterpenes, sterol, Glauanol, Hentriacontane, β sitosterol, Glauanol acetate, Tiglic acid, Esters of Taraxasterol, Lupeolacetate, Phytosterol, Tannins, Steroids, Flavonoids, Alkaloids, glycoside.	
			Tetra triterpene, Glauanolacetate, Racemosic acid, Alkaloids, Glycosides, Flavonoids, Phenolic compound, Tannins, sterol.	62
		Leaves	Cycloartenol, Euphorbol, Taraxerone, Tinyatoxin, Flavonoids, Tannins, Saponins, Alkaloids, Steroids.	52
		Root	Sterol.	
	Latex	Steroids, alkaloids, tannins, glauanol acetate, glycoside, sterol	5	
	Stem bark			

9.	<i>Ficus religiosa</i>	Bark	Tannins, saponin, triterpenes, sterol, glycoside, leucoanthocyanidin, leucoanthocyanin, flavonoids.	35
		Crude latex	Phytosterols, furanocoumarin. Serine protease	54
		Stem bark	Phenols, tannins, steroids, alkaloids and flavonoids, β -sitosterol-d-glucoside, vitamin K, n-octacosanol, methyl oleanolate, lanosterol, stigmasterol, lupen-3-one.	16
		Root	β -sitosterol-d-glucoside	67
		Fruit	Amino acids, protein, volatile compounds, flavonoids, phenolic compounds.	
		Seed	Phytosterolin, β -sitosterol, glycoside, albuminoids, carbohydrate, fatty matter, coloring matter, caoutchoue.	
		Leaves	Phytosterols, triterpenes, tannins, protein, carbohydrate.	

CONCLUSION

Ficus species have been used traditionally for various ailments and have been reported for usage as ethnomedicine throughout the world. This review presents the traditional uses, phytochemical constituents, and pharmacological activities based on ethnopharmacological claims associated with the *Ficus* genus. Extensive research revealed widespread traditional use in various African and Asian countries, yet only a few species have undergone scientific evaluation. In this study, the traditional used Indian *Ficus* species were listed and analyzed. This study has also shown that medicinal plants continue to be the primary source of healthcare in most of the areas and are the most widely used source for basic healthcare requirements. However, it has been discovered that the younger generation's awareness of medicinal plants is fading, and efforts must be made to preserve this valuable local knowledge. Based on this review it is concluded that the plants present in the genus *Ficus* have great medicinal importance traditionally and

phytochemicals present in these plants are responsible for the various therapeutic applications. The isolation of primary and secondary metabolites, plant pigments have all been made possible through phytochemical study. A wide range of pharmacological properties for example: antioxidant, anti-diabetic, anti-cancer, anti-inflammatory, etc. have been demonstrated using fresh plant materials and crude extracts of Indian *Ficus* species. Future research should aim to validate traditional claims of other species, emphasizing bioassay-guided drug discovery, formulation, and administration methods, aspects often lacking in existing literature. Well-designed clinical studies are necessary, delving deeper into mechanisms based on in vitro and in vivo investigations to better understand the ethnopharmacological applications of these plants. These facts taken together make this genus *Ficus* very suitable for further exploration of new pharmaceutical agents.

Conflict of interest: The authors declare no conflict of interest.

Ethical approval: The authors are grateful to the Department of Chemistry, Kanya Gurukula Campus, Gurukula Kangri (Deemed to be University), Haridwar for providing all the necessary facilities. Palak Kansal performed the literature search, analyzed the data, created tables and figures. Abha Shukla approved the manuscript for final submission.

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