

LEEA INDICA (BRUM. F) MERR.: A SYSTEMATIC REVIEW OF ETHANOMEDICINAL, PHYTOCHEMICAL AND PHARMACOLOGICAL PROFILE

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ABSTRACT

Leea indica (bandicoot berry), a Thai originated woody plant, distributed in Asia and Australia. The study investigates the botanical features, ethno-medicinal uses, Phytochemistry, therapeutic utilities, limitations and future prospectives of *Leea indica*. The study data on *Leea indica* was gathered from PubMed and Google Scholar, database. Study revealed the presence of flavonoid, steroids, and various bioactive components such as gallic acid, myricetin, mollic acid etc. in whole plant. Indigenously, herbs have been used in folk medicines for treating Diarrhea, dermatosis, wound, pyrexia and tumors. The research focuses on the therapeutic analysis reveals beneficial effects such as antimicrobial, antioxidant, anti-inflammatory, antimicrobial, antidiabetic, and antitumor. Despite these promising findings, gaps remain regarding limited toxicology data, undefined molecular action and extract standardization. This review highlights the need of advanced toxicological and clinical assessments for the development of phytopharmaceuticals.

KEYWORDS: *Leea indica*, phytochemistry, pharmacology, isolation, toxicology.

INTRODUCTION

Leea indica commonly known as Indian tree grape and Thai aroser is a heritage of herbal practices. The plant shared the countries across Asia and Australia.^[1,2] In Thai medicinal practices the plant is used in the remedies of ulcer, fluor albus and tumors, Foliages are used in remedies for sleeplessness and Bowel disease while, the Concentrate of wild rhea, ivy of Paraguay and *L. indica* roots cure lymphadenitis and furuncles. The leaves are rich in palmitic acid, Gallic

acid, ellagic acid and in long chain hydrocarbons. Study suggested the beneficial effect of extract in diarrhea, microbial infection, diabetes, inflammation, hair growth and in tumors.^[3-5] Plants are universal gift and employed in natural remedies for their effectiveness, well tolerated and affordability.^[6,7] This investigation aims to provide a methodological overview of *Leea indica*, addressing its botanical features, ethno-medicinal uses, Phytochemistry, therapeutic utilities, limitations and future prospectives in the pharmaceuticals.

METHODOLOGY

Systemic search

Researchers systematically analyzed the researches from google scholar and pub med (2008-2026), according to PRISMA guidelines (Figure 1). Search phrases assessed are *Leea*, *Leea indica* and pharmacology of *Leea indica* (open access/archived). The preliminary documents subjected to robust screening process, manually. The titles and summary are initially reviewed for alignment with the study questions, limiting the sets for probably significant researches.

Selection measures

This study includes articles highlighting the plant *Leea indica*, pharmacology of *Leea indica* (in vivo, invitro) extracts/purified chemical, dose and formulation. Freely archived full text data were considered for the study.

Exclusion measures

This study filtered out data missing *Leea indica*, clear formulation and methodologies, restricted entire text, document inconsistent with the phrases used in search engine. Additionally, redundant sets were also omitted.

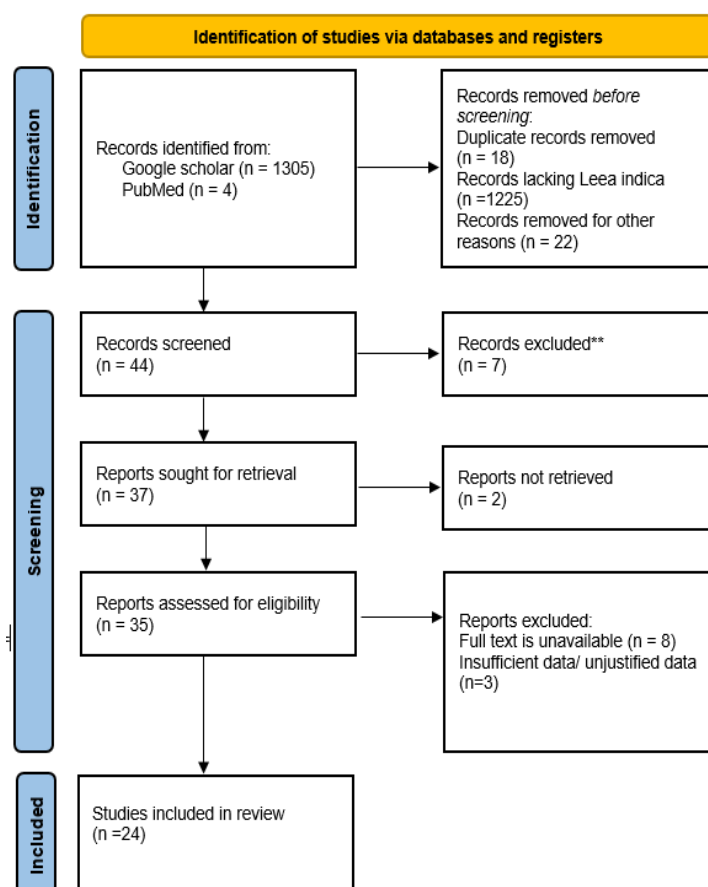


Figure1: Systematical collection of data as per PRISMA guidelines.

RESULTS AND DISCUSSION

Botanical description

L. indica, a woody perennial treelet of approx. 200-1600cm height. Leaves are ovate, 250×100mm, dentate, hairy and are sharply pointed. Flower are hermaphrodite with whitish-green pentamerous corolla, blossoms during year round. Plant bear Ripped dark purple succulent fruit of 0.8cm, having 6 seeds and found mainly in India, China, Thailand and Malaysia.^[1,8,9] The plant taxonomy and synonyms/ vernaculars is depicted in figure 2.^[1]



Figure 2: Taxonomy, synonyms and vernaculars of *Leea indica*.

Ethnobotany

As per WHO, ethnic formulations are used by 80% of peoples globally to cure their basic health issues. Ethnic formulations are cheap, affordable and easily available for everyone and also act as a back bone for Ayurveda and allopathy.^[10] In India, *Leea indica* has used traditionally to cure a multiple of health issues like Diabetes, Fracture, Psoriasis, Dermatitis etc. (Figure 3).



Figure 3: Ethanomedicinal usage of *Leea indica*.

Phytochemical investigation

Phytochemical inspection, investigates the chemicals present in the plant, to pinpoint the pharmacologically active phytoconstituents. Studies asserted the occurrence of alkaloid, terpenoids, flavonoids, Phlobatannins, phenols, steroids in leaves extracts, mentioned in table 1.^[11–14] Secondary metabolites possess therapeutic potential and be a lead compound in drug formulation (table 2).

Table 1: Phytochemical analysis of different extract of *Leea indica* leaves.

Phytochemical	Aqueous	Ethanollic	Chloroform	Methanolic	Ethyl acetate
Alkaloid	+	+	+	+	-
Flavonoids	+	+	+	+	-
Steroids	-	+	+	+	-
Phenols	+		-	+	-
Terpenoids		+	-	+	
Tannins	+	+	+	+	-
Saponins	+	-	-	-	-
Phlobatannins	+	-		+	-
Proteins			-		
Carbohydrates	+		+	+	
Lignins	-		+	-	+
Glycosides	+		+	+	+

Table 2: Isolated compounds from various extracts of *Leea indica*.

Plant part	extract	Isolated chemical	Ref.
Leaves	Methanolic	farnesol	[10,15]
		Gallic acid	
		Palmitic acid	
		Urosolic acid	
		di-n-butyl phthalate	
		Butyl-2-ethylhexyl phthalate	
		Isooctyl phthalate	
		Phthalic acid	
		Lupeol	
		β -sitosterol	
	ethanolic	Gallic acid	[16]
		Methyl gallate	
		epigallocatechin-3-O-gallate	
		myricetin-3-O-rhamnoside	
		quercetin-3-O-rhamnoside	
		4',6'-dihydroxy-4-methoxydihydrochalcone 2'-O-(3''-O-galloyl)- β -D-glucopyranoside	
		4',6'-Dihydroxy-4-methoxydihydro chalcone 2'-O-glucosyl pentoside	
		4',6'Dihydroxy-4-methoxydihydro chalcone 2'-O-rutinoside	
	Ethyl acetate	Mollic acid α -L-arabinoside	[10]
		Mollic acid β -D-xyloside	
	ethyl acetate fraction	Mollic acid arabinoside	[17]
		Mollic acid xyloside	
	Methanol extract	Palmityl oleate	[18]
		Glyceryl-1-linoleio-2-dotriacontanyl -3-linoleniate	
		6 β -Hydroxyundecanylecaprate	
		7 β -Hydroxydodecanylecaprate	
		1-Triacontanol	
Flower	Diethyl ether	di-n-butylphthalate	[4]
		di-isobutylphthalate	
		n- butylisobutylphthalate	
		Butylisohexylphthalate	

Pharmacological activities

Pharmacological profile is the competence of a chemical to induce biological effect on an organism.^[3] *L. indica* be endowed with a variety of therapeutic potentials such as antioxidant, analgesic, anticancer, antimicrobial etc., mention in table 3.

Toxicology

Research on methanolic extract of leaves was found the LD₅₀ at 300mg/kg, i.p.^[19]

Table 3: Pharmacological application of *Lea indica*.

Extract/ compound	isolated	Dosage	Result	Ref.
Anticancer (leaves)				
Mollic acid	-	-	Induce Ca Ski cell apoptosis via, DNA fragmentation and increased Bax/Bcl-2 ratio	[8]
Methanolic extract	-	-	Activate NK cell and boost susceptibility to OVCAR-5 Cancer cells	[20]
Ethanol extract	-	20-1000 µg/ml	Showed cell lethality of brine shrimp in dose gradient manner	[11,21]
Methanolic extract	-	40 mg/kg	Reduce tumor life span and weight and boosts life span in Ehrlich Ascites Carcinoma of mice	[19]
Ethanol/methanolic extract	-	-	Induce morphological alteration and cell shrinkage in DU-145 and PC-3 cell lines	[14]
Gallic acid PLGA nanoparticles	-	10-100 µg/mL	Decreased cytotoxicity in MRC-5 cell lines	[22]
Anti-inflammatory (leaves)				
Methanolic extract	-	1000 µg/mL	Reduced protein degradation and hemolysis in albino mice in a dose dependent manner	[3]
Nephrotoxicity (leaves)				
Aqueous extract	-	-	Increase filtration and maintain normal nephron	[23]
Antidiabetic (leaves)				
Ethanol extract	-	100-200 mg/kg	Improve blood glucose regulation, decrease insulin resistance and protect pancreatic cells of Balb-C mice	[24]
Methanolic extract	-	200 mg/kg,	Decrease blood glucose levels in rats	[2]
Antimicrobial (leaves, fruits)				
Aqueous/ butanol extract	-	0.5-1.5 mg/mL	Showed amoebicidal effect by killing trophozoites and cysts in <i>Acanthamoeba triangularis</i>	[11]
Aqueous extract	-	-	Nanoparticles Rapture cell membrane and inhibit growth of <i>S. aureus</i> , <i>S. thypi</i> and <i>E. coli</i> .	[2]
Ethanol extract	-	20 µL	Showed highest zone of inhibition in <i>E. Coli</i> . ATCC 25922	[5]
Thrombolytic (leaves)				
Methanolic extract	-	10 mg/ml	Showed dose dependent thrombolytic activity (p < 0.001)	[3]
Antioxidant (leaves)				
Methanol/ethanol extract	-	100- 500 µL	Showed radicle scavenging activity by neutralizing hydrogen peroxide	[11,14, 19]
Ethanol extract	-	0-20 mg/ml	Showed significant hydrogen peroxide neutralizing ability	[4]
Methanolic extract	-	50 µL	Show IC ₅₀ of 32.1 ± 18.7, 101.3 ± 12.15 and , 50.5 ± 1.55 for DPPH, ABTS and FRAB respectively	[12]
Wound healing (stem)				
Ethanol extract	-	-	Showed increased cell migration toward scratch in NIH 3T3 mice	[2]
Hair growth promoter (leaves)				
Methanolic extract	-	10 µL	Showed significant increase in hair length in mice	[3]

Analgesic (leaves)			
Ethanolic extracts	200 mg/kg	inhibited writhing response, decrease pain induced by formalin and acetic acid in mice	[25]
Hepatoprotective (stem)			
Ethanolic extract	200, 400 mg/kg	Showed reduction in bilirubin and serum markers induced by acetaminophen in rats	[2]
Antipyretic (roots)			
Methanolic extract	-	Showed decreased in body temperature in malaria mice model	[26]
Inflammatory bowel disease (roots)			
Methanolic extract	200,400 mg/kg	Significantly reduce inflammation in rats in dose gradient manner	[27]

CONCLUSION

The study methodically investigates the metabolites, ethno and therapeutic utilizations of the plant *Leea indica*. Predominantly, flavonoid and steroids are dominant in plant. The review emphasizes the isolated metabolites that may be a promising lead compound for the development of new therapeutic agent. The therapeutic properties of plant provide empirical evidences for its use in traditional medicines and provide a safer dose for benefits and safety. Comprehensively, this research offers a better understanding of *Leea indica* and enabling to discover hidden potential.

DEFICIENCIES AND CONSTRAINTS

Despite certain limitations, the investigation documents the therapeutic potential and phytochemicals isolated. The following challenges might be experienced throughout the review:

- Meager pharmaceutical application of isolated compounds.
- Finite toxicology investigations on plant

Scarce analysis in these plant may be associated with methodological obstacles or resource allotments.

FUTURE PROSPECTS OF RESEARCH

The study provides following suggestions for future study on *Leea indica*.

- Foster research in compound isolation and therapeutic to uncover the beneficial effects.
- Establishing toxicology studies to strengthen the protocols for nontoxic in vivo studies.
- Clinical assessments are essential to validate plant therapeutics.

AUTHORS CONTRIBUTION

All authors are equally contributed to conceptualization, methodology, writing and editing.

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