



Medicinal Uses of *Embelia ribes* Burm. F. - A Review

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Abstract *Embelia ribes* Burm. f. is a threatened medicinal plant, studied extensively for its rich medicinal properties. It has been used in ayurvedic formulations from the ancient times and in the recent past a surge of research on this particular medicinal plant species has been undertaken. This particular species is found to attribute to a number of medicinal properties such as antidiabetic, anticancer, antimicrobial, antitumor, antifertility activity and many more. Hence this highly comprehensive review has been under taken to highlight the areas of research where in this particular species is extensively studied and the current status of this important threatened medicinal plant.

Keywords *Embelia ribes*, Ethnopharmacology, Medicinal uses, Threatened, Embelin, Phytochemistry

Introduction

Herbal medicine is still the mainstay of about 75–80% of the world population, particularly in the developing countries, for primary health care because of better cultural acceptability, compatibility with the human body and lesser side effects [1]. Keeping note of which many of the drugs today are being developed from plants that are used in traditional systems of medicines such as Siddha or Ayurveda. The references of which can be found in ancient Vedas and sacred texts such as the Muslim Materia Medica, the text of Jami of Ibn Baiar (1248 A.D.), which lists more than 2,000 substances; including many plant products, the principal Ayurvedic text on internal medicine, the Charka Samhita, which describes 582 herbs or the main text on surgery, the Sushruta Samhita, which lists some 600 herbal remedies. As most of the plants are documented for their medicinal properties, in various traditional systems, they are more likely to contain active chemical compounds thereby proving particularly successful in discovery of new and more effective drugs

Embelia ribes Burm. f., mentioned since the ancient times, in the form of the drug 'Vidanga' or 'Baibidanga' has been an important ingredient in a number of ayurvedic formulations [2]. *Vidanga* has found a mention in all the three ancient Indian ayurvedic texts namely *Charakh Samhita*, *Sushurta Samhita* and *Ashtanga hridayam*. Besides Ayurveda, *Vidanga* is reported to be used in Unani (*Baobarang*), Siddha (*Vaivilangam*), Folk, Tibetan (*Byi dan ga*) and Homopathic (*Embelia ribes*) systems of medicines as well. Many scholars of Ayurveda and botany have correlated *Vidanga* to the plant *Embelia ribes* Burm. f. *Vidanga* was included as official drug in the Indian Pharmacopoeia in the year 1966 and the botanical origin was described as fruits of *E. ribes* only. Since then, it is widely accepted that the botanical source of the drug 'Vidanga' is the dried berries of fruits of *E. ribes* belonging to family Myrsinaceae [3]. Although *E. ribes* have been used in other medicinal systems such as Unani, Homopathic etc, the major system employing *E. ribes* and its constituents is the ancient Ayurveda as shown in Figure 1.



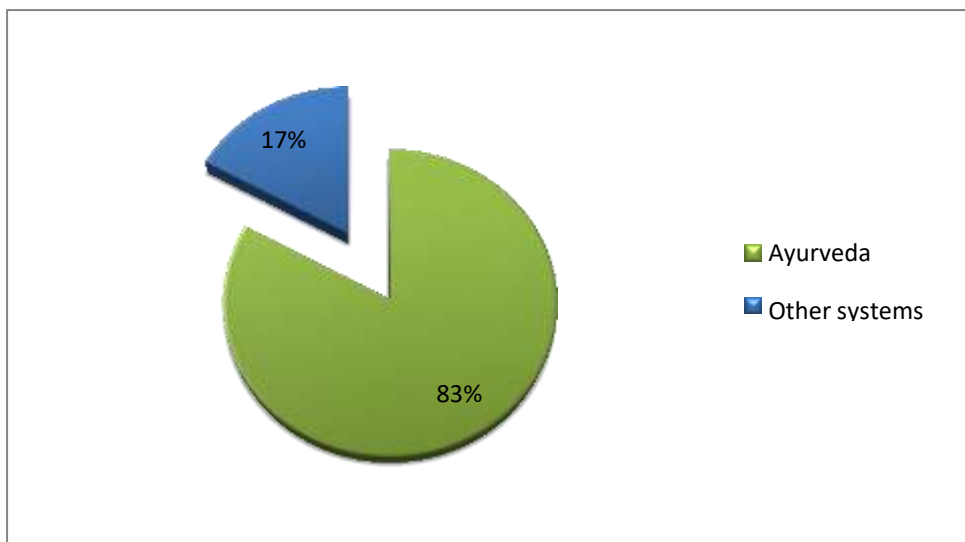


Figure 1: Percentage of *E. ribes* used in Ayurveda and other systems

Ayurvedic Properties

E. ribes is found attributing to 6 different of ayurvedic properties [4,5], which has formed as the basis for many ayurvedic formulations as shown in Table 1.

Table 1

Rasa (taste) - Katu (pungent), Kashaya (Astringent)
Guna (qualities)- Laghu (lightness), Ruksha (dryness), Teekshna (piercing, strong)
Virya- Ushna – hot potency
Vipaka- Katu – Undergoes pungent taste conversion after digestion.
Prabhava – Special effect - Krumighna – relieves worm infestation.
Tridosha – Because of hot potency, it balances Kapha and Vata Doshas.

Ayurvedic Formulations

E. ribes has also been used in about 75 different ayurvedic formulations [6] some of the commonly used formulations are given in Table 2.

Table 2

Formulation	Uses
Sara	Eases the movement of contents in the intestinal track
Krumihara	Useful in worm infestation
Krumikushta	Useful in infective skin diseases
Pramehahara	Useful in diabetes
Shirorogahara	Useful in headache
Vahnikara	Improves appetite
Shulahara	Useful in abdominal colic pain
Adhmanahara	Relieves bloating
Udarahara	Useful in abdominal distension, ascites
Shleshma Krumihara	Useful in worm infestation of Kapha origin
Vatahara	Balances vata
Artinut	Relieves pain
Agnimandyahara	Relieves indigestion, weak digestion
Aruchihara	Relieves anorexia
Vibhrantihara	Relieves dizziness
Shirovirechana	Nasal drops



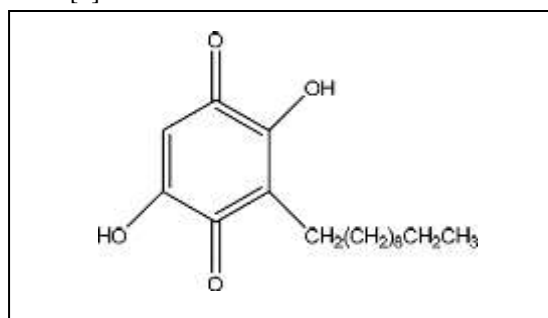
Traditional Uses

E. ribes has been used traditionally in various health care purposes for over 5000 years [7]. The traditional uses are as follows:

- It detoxifies blood, hence useful in wide range of skin diseases. It has contraceptive effect, along with Pippali (long pepper)
- It improves skin complexion and also used for rejuvenation purpose.
- Its water decoction is used for oil pulling to relieve dental caries and bad breath in skin diseases, it is used both orally and externally in the form of paste.
- It has mild diuretic action.
- It is useful against vomiting, bloating, indigestion, gastritis and constipation. It is widely used in weight loss treatment.

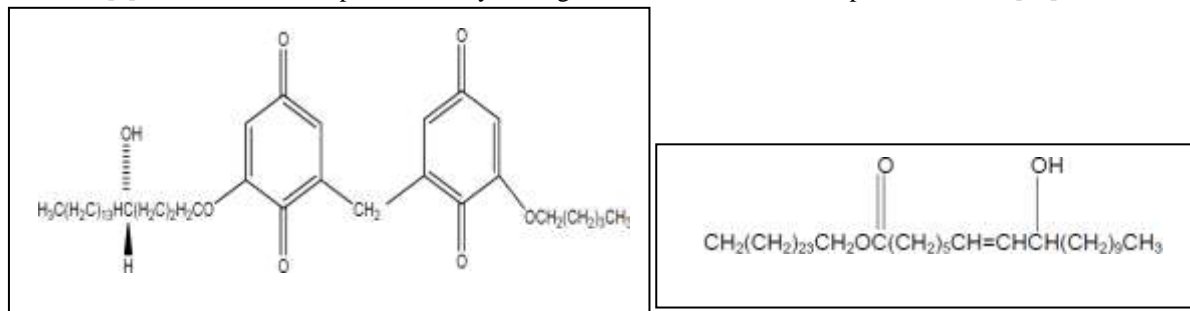
Phytochemistry

The ripe fruits of *E. ribes* are the most commercially important part of the plant; as they have been found to contain the active compound namely Embelin [8].



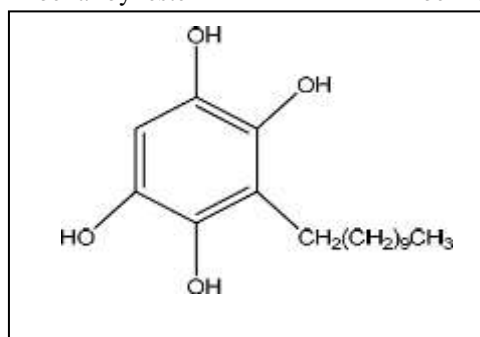
Embelin

Further phytochemical investigation resulted in three new compounds namely embelinol, embeliaribyl ester and embeliol [9]. Also another compound namely Vilangin was isolated from the ripe fruit berries [10].



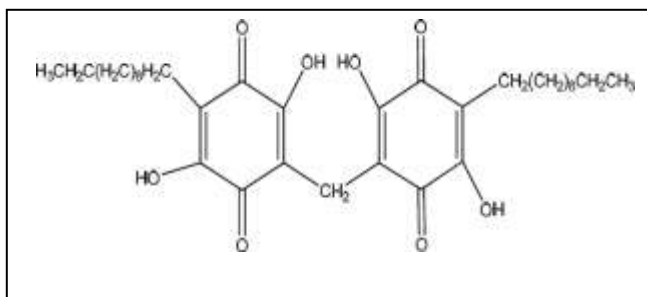
Embeliaribyl ester

Embelinol



Embeliol





Vilangin

Yet another compound discovered from *E. ribes* during the late nineties is the Potassium embelate [11]. The plant has also been found to contain quercitol and fatty ingredients, an alkaloid, christembine, a resinoid, tannins and minute quantities of a volatile oil [12]. It has also been studied that the seeds of *E. ribes* showed the presence of Cr, K, Ca, Cu, Zn and Mn along with high carbohydrates [13].

Stress degradation studies on embelin were carried out and it was found that embelin was susceptible to oxidative, acid and to lesser extent thermal degradation. It was observed that embelin etherifies when stored in alcohol (methanol or ethanol) in presence of acid to form corresponding ethers of embelin. The relevance of these studies in predicting the stability of embelin in Ayurvedic formulations is that they are known to contain self-generated alcohol which under acidic conditions may undergo etherification to form corresponding ether of embelin [14].

Pharmacology

Following the folk and traditional uses of *E. ribes*, it is being investigated scientifically to confirm its potentiality to cure and treat various diseases [15]. Some of the reported pharmacological activities of *E. ribes* are mentioned in Table 3.

Activity/ Disease	Tested Organism	Extract/ derivatives/Salts	References	
Analgesic activity	Rat	Embelin	[16]	
		Embelin- disalts	[17]	
		Potassium embelate	[18]	
Anthelmintic activity	<i>Pheritima posthuma</i> , <i>Haemonchus contortus</i> , <i>Taenia canina</i> , <i>Phamphistomum cervi</i>	Aqueous and alcoholic extracts	[19,20,21,22,23]	
Antianxiety activity	Rat	Embelin	[24,25,26]	
Antibacterial activity	<i>Bacillus subtilis</i> , <i>Staphylococcus aureus</i> , <i>Escherichia coli</i> , <i>Pseudomonas aeruginosa</i>	Aqueous and ethonolic extracts	[27, 28]	
		Bacillus Polymyxa and <i>Proteus vulgaris</i>	aryl substituted benzoxadiazine	[29]
		Goat	Seed oil	[30]
Antinematodal activity	Goat	Seed oil	[30]	
Ascaricidal properties	<i>Taenia</i> and Hookworm	Seed oil	[31]	
Anticancer activity	fibrosarcoma cell line	Embelin	[32]	
	HeLa cell line	5- <i>O</i> -ethylembelin, 5- <i>O</i> -methylembelin(derivatives)	[33,34]	



	PC-3 xenograft model	Embelin	[35]
	HepG2 cells	Embelin	[36]
	Wistar rats	Embelin	[37]
	MCF-7 cancer cells	Embelin	[38]
	Human leukaemic cells (K562) and Dalton's Lymphoma ascites cells (DLA)	Embelin	[39]
osteoporosis and cancer-linked bone loss	Breast cancer cells	Embelin	[40,41]
Anticonvulsant activity	Rat	Embelin	[42]
Antidepressant activity	Mice	Embelin	[43]
Antifertility activity	male albino rats	Embelin	[44,45,46,47,48]
	male bonnet monkeys	E.ribes berries	[49]
	rabbits	Embelin	[50]
Antifungal activity	female Sprague-Dawley rats	Embelin	[51,52]
	<i>Colletotricum crassipes</i> , <i>Cladosporium</i> , <i>Armillariamellea</i> , <i>Colletotricum capsici</i> , <i>Aspergillus niger</i> , <i>Rhizopus oryzae</i> , <i>Aspergillus terreus</i> and <i>Candida</i> <i>Candida</i> species	Seed Extract	[53]
Antigenotoxicity activity	mouse bone marrow cells	Embelin	[54,55,56]
Antihistamic activity	guinea pigs	Embelin	[58]
Antimitotic activity	Bengal gram seeds and germinating Onions	2-hydroxy-5-substituted-3-undecylcyclohexa-2,5-diene-1,4-diones (derivatives)	[59]
Antioxidant and Neuroprotective activity	Rat	Embelin	[60,61]
	Male Wistar albino rats	ethonolic extracts	[62,63]
	peripheral blood human lymphocytes	Embelin	[64]
Cardioprotective activity	Rat	Aqueous and alcoholic extracts	[65,66,67]
Cosmetic agent	-	Embelin	[68]
Wound healing activity	Swiss Albino Rats	ethonolic extracts, Embelin	[69,70]
Nephroprotective activity	albino rats	ethonolic extract, Embelin	[71,72]
Antidiabetic activity	Wistar rats	ethanolic extract, Embelin	[73,74,75,76,77]



It has also been analysed that although research has been focussed to study the various activities of *E. ribes*, major part of the studies is focussed in the fields of cancer, diabetes and infertility as *E. ribes* has proved to be a very good candidate for antitumor, antiglycemic and antifertility activity (Figure 2). Further analysis showed that a major number of these studies are conducted either using aqueous alcoholic extracts or by employing the purified embelin compound (Figure 3). Although there have been studies employing various derivatives of embelin compound.

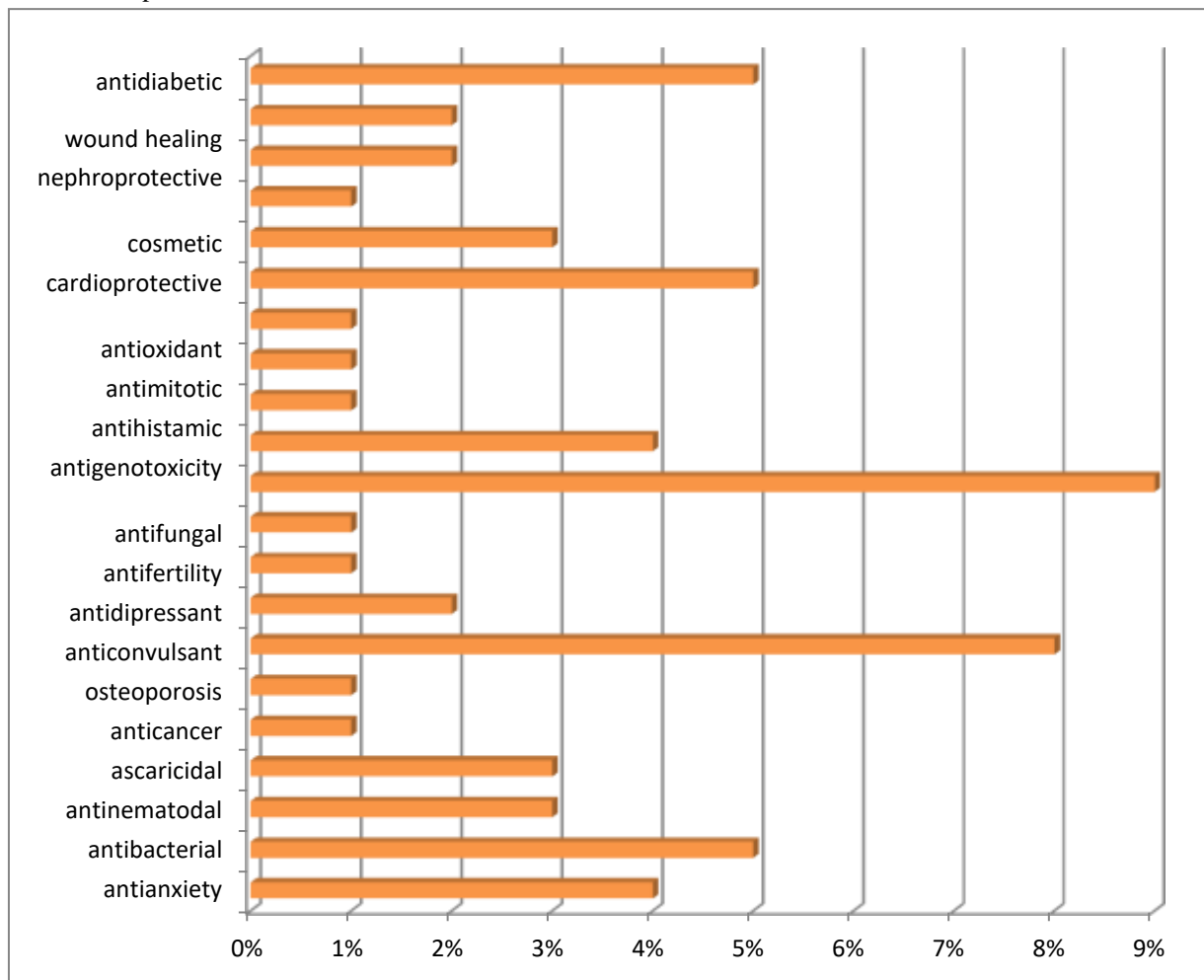


Figure 2



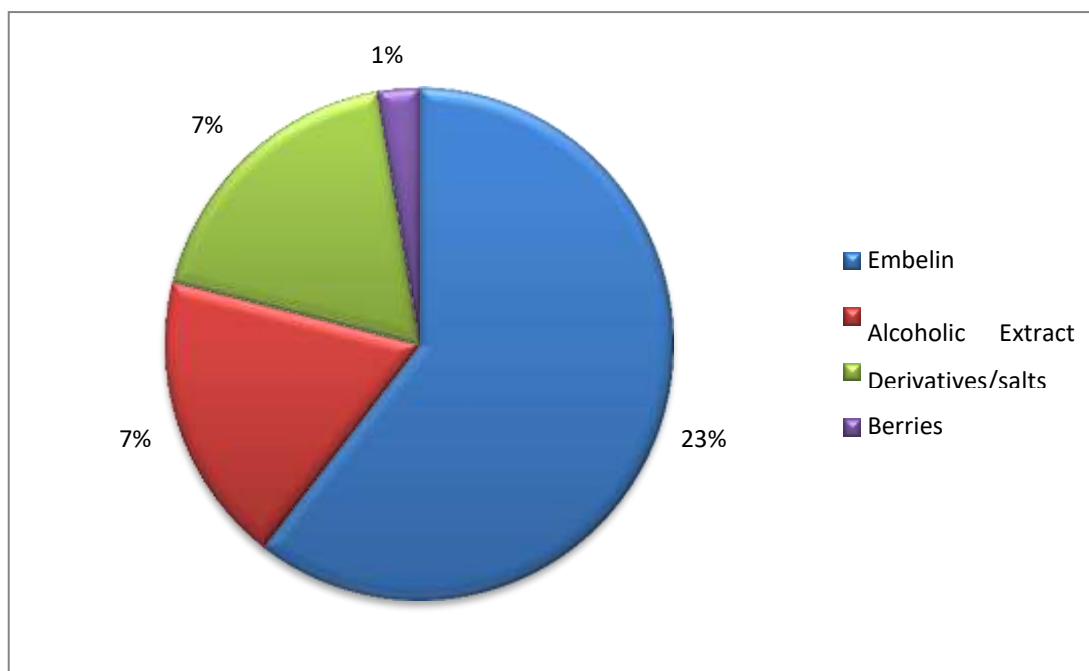


Figure 3

Discussion and Conclusion

Plants have been a source of medicine from time immemorial. Though health management systems have two distinct areas namely traditional system of medicine and modern system of medicine, their common roots are medicinal plants [78]. It is therefore very important to have proper documentation of the medicinal plants, their sources, effects and uses. Thus, a detailed and systematic ethnomedicinal study is required for identification, cataloguing and documentation of plants, which will help promote traditional knowledge of herbal medicinal plants, further fuelling research and identification of newer drugs in the field of medicinal plants.

It is seen from the literature that *E. ribes* is a very important medicinal plant for its extensive medicinal properties. The plants show a number of pharmacological activities such as wound healing, antitumor, cardiovascular, hypoglycemic, antioxidant, antimicrobial, antidiabetic and antifertility. Many other traditionally uses are also reported such as blood purifier, cosmetic agent, oil pulling and oral contraceptive which are still being studied till today and further research is still in progress. Thus, it can be concluded that *E. ribes* is a promising target to generate newer and novel drugs.

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