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Traditional uses, phytochemistry and pharmacology of *Embelia ribes* Burn: A review

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Abstract

Embelia ribes Burm (Myrsinaceae) has been popularly accepted in traditional medicine for a popular extend of diseases namely sore throat, influenza, tooth pain, pneumonia, headache, carbuncle, abdominal disorders, paralysis, leucoderma, cavities, skin disease, indigestion, constipation, paralysis, convulsions, epilepsy and worm infestation. This objective of the current review is to encompass the splited fact accessible on the traditional uses, phytochemistry, pharmacology of *E. ribes* to inquire its beneficial prospective and upcoming research possibilities. All the accessible fact on *E. ribes* was composed through computerize finding (employing Sci Finder, Pubmed, Scopis and Google Scholar) and a finding of the library. Traditional uses of *E. ribes* are documented all over India, SriLanka, Singapore, Malaysia and S. China. It is distributed in moist deciduous forests of the Western Ghats of South India, Jammu Kashmir, Himachal Pradesh, Uttar Pradesh, Assam and Maharashtra, where it has been employed for the different types of diseases. The research on bioactive compounds had escort to the seclusion of homoembeline, homorapanone, vilangine, quercitol, Emelicaacid, 2.5% embelin, C₁₈H₂₈O₄, Alkaloid (christembine), Resine (embeline) also fixed oil & volatile oil from *E. ribes*. Bioactive components and extracts of *E. ribes* expressed a vast extend of pharmacological activities namely analgesic, anti-anxiety, anticonvulsant, antioxidant, neuroprotective, cardioprotective, wound healing, nephroprotective and antidiabetic activity in rat, antihelminthic activity (*Pheritima posthuma*, *Haemonchus contortus*, *Taenia canina*, *Phamphistomum cervi*), Antibacterial activity (*Bacilus subtilis*, *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa*) and antifertility activity. *E. ribes* arised like substantial provenance of traditional medicine for the cure of different diseases even though different *in vivo* and *in vitro* studies authenticated its traditional medicinal uses.

Keywords: *Embelia ribes*, phytochemistry, pharmacology, analgesic, antihelminthic nephroprotective

Introduction

From ancient time, plants are the primary provenance of subsistence and medicaments for human beings^[1]. In current scenario nearby 80% of the total world's population avails herbal medicaments for health attentiveness^[2]. As per different geographical locations different civilizations avail herbs for treating common diseases and disorders^[3],^[4]. Since many years ago different herbal medicaments treatments have validated to be very effective as compared to modern medicaments up to a certain extent. In case of human beings as well as animals the natural form (extracts, decoctions, paste and powder) of the herbal medicaments are used to treat various diseases and disorders^[5],^[6]. As due to side effects of modern medicaments and its failure in certain diseases and disorders, Still today herbal medicaments dominated over the modern medicaments^[7],^[8]. *E. ribes* (Myrsinaceae) is the supreme famous member of the *E. ribes* species and is known through different names (Appendix A). *E. ribes* is native to the India, SriLanka, Singapore, Malaysia and S. China, moist deciduous forests of the Western Ghats of South India, Jammu Kashmir, Himachal Pradesh, Uttar Pradesh, Assam and Maharashtra^[9],^[10],^[11]. Vidanga is a tuberous plant it has trifoliate leaves simile to *Butea monosperm*, it is known as Vidari because it is use after cutting in pieces, the tuber of Vidanga grow inside the ground and it appears like Kushmanda(*Curcubito pepo*) that's why it is known as Bhookusmanda, the latex of Vidanga is milky white while the tuber is black. Its inner side looks in white colour due to large quantity of milky latex, it never fail for the treatment of disease i.e. certainly acts as anthelmintic, it perform as antimicrobial and anthelmintic^[12]. *E. ribes* is a climber creeper shrub flexible, and terete branches, stems are whitish grey leaves are shiny and nodulated about 3 inch long and 1 1/2 inch

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broad, flowers greenish yellow to whitish pink in colour small in size. The fruits found in bunches, colour of the fruit is reddish brown to blackish its outer covering is fragile and inner seed is spotted [13]. The Seeds are contain Cr, K, Ca, Cu, Zn and Mn and high carbohydrates with nutritive value [14]. In the current study, an effort is made to document the traditional importance, phytochemistry and pharmacology of *E. ribes* in contemplation to focus research divergences and impart a scope that enabling upcoming research assignments on the *E. ribes*.

Appendix A: Common Names of *Embelia ribes*

S. No.	Region/Language	Name
1.	English	False black berry
2.	Hindi	Vaividanga
3.	Marathi	Bavidang
4.	Bengali	Vidanga
5.	Kannada	Vayu Vilanga
6.	Malayalam	Vijhala
7.	Tamil	Vellal
8.	Telugu	Vayu Vidangalu
9.	Oriya	Vidanga
10.	Punjabi	Bavidanga
11.	Gujarati	Bavadan

Traditional Uses

The emergence of this plant was found to be in moist deciduous forests of the Western Ghats of South India. The extracts of seed have shown antifungal activity i.e. *Colletotricum capsici*, *Aspergillus niger*, *Aspergillus terreus* and *Candida albicans* etc [15]. Its dried fruits powder are used for the preparation of medicine. Leaves with ginger (*Zingiber officinale*) are used for the treatment of sore throat, decoction of root were used for treatment of influenza, root bark powder in tooth pain and paste was applied on chest for the treatment of pneumonia and with butter in headache it was applied on forehead [16]. Vidanga taila containing *Croto nigirium*, sodium carbonate is used for the treatment of headache [17]. A paste of *Embelica officinalis*, *Piper nigrum*, *Ternanalia bellirica* powder and honey was for the treatment of carbuncle. The leaves and fruits are used the treatment of abdominal disorders by Taigan people of Arunachal Pradesh [18]. A paste made up of *Withania somnifera*, *Asparagus racemosa* roots and leaves of *E. ribes* is use with hot water for the treatment of paralysis [19]. A mixture of *withania somnifera* root, bark of *E. ribes*, leaves of *Plumbago zeylanica*, seed of *Croton tiglium* and cow's urine. It is used for the treatment of leucoderma [20] and its hydroalcoholic extract showed significant decrease in body temperature [21].

Phytochemistry

Phytochemical Components of *E. ribes* plant possess potassium embelate, 2, 5-dihydroxy, 3-undecyl-1,4-benzoquinone, embelin, quercitol, fatty ingredients and vilangin. Its berries possess different chemical component namely embelin, volatile oil, fixed oil, resin, tannin, christembine (alkaloid), phenolic acids as caffeic acid, vanillic acid, chorogenic acid, cinnamic acid, o-cumaric acid and 4.33% of the embelin content [22], [23], [24].

Pharmacological Properties

Analgesic activity: Embelin possessed orally effective analgesic property (non-narcotic) that take action centrally [25].

Anthelmintic activity: Different doses (10 mg/ml, 50 mg/ml and 100 mg/ml) of *E. ribes* Seed administration reveal death of the worms (*Pheretima posthuma*) [26].

Anti-bacterial activity: Antibacterial activity against (*Bacillus subtilis*, *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa*) [27].

Antioxidant property: The kinetics and mechanism of reactions of embelin with hydroxyl, one electron oxidizing, organo-haloperoxyl and thiyl radicals by nanosecond pulse radiolysis procedures shows that in physiological context embelin behave like a competitive antioxidant [28].

Anti - diabetic activity: *E. ribes*'s oral doses 100 & 200 mg/kg for 40 days shows decreased in the level of blood glucose [29].

Anticonvulsant activity: Embelin retain anticonvulsant activity against petit mal & grand mal epilepsy [30].

Anti-cancer activity: As hepatic hyper plastic nodules interrepted by embelin (50 mg/kg/day in addition with curcumin 100 mg/kg/day). Embelin was observed to decrease the size of the tumor & obstructed the activity of serum enzymes. It also militate in metabolism of the amino acid & carbohydrate of animals suffered with tumours [31].

Antifungal activity: As per NCCLS (The national committee for clinical laboratory standard M27-A2 Protocol) *in vitro* antifungal susceptibility evaluation was performed that revealed its antifungal activity against *Candida albica*, *Candida parapsilosis* and *Candida laurintis* [32].

Molluscicidal activity: Powder of *E. ribes* fruit in addition of *Azadirachta indica* and oil of the *Cedrus deodara* oil with synergists MGK-264, piperonyl butoxide (PB) in binary and tertiary addition were observed against the *Lymnea acuminata* that reveal the toxic effects of these mixtures were time and dose-dependent. The binary & tertiary mixtures of plant-derived molluscicides with synergists were more toxic with regard to the single cure of the plant-derived molluscicides [33].

Wound healing property: The dose (30 mg/ml) of the ethanolic extract of *E. ribes* and embelin were noticed to have wound healing activity [34].

Antifertility activity: *E. ribes* berries & embelin (dose levels 0.3, 0.4 and 0.5mg/kg body weight administered subcutaneously for 35 days) change the testicular histology, glycogen, gametogenic counts and accessory sex gland fructose that showed its anti-androgenic activity [35].

Antinematodal activity: The mixture of Kali zeeri (*Veronia anthemintica* seed) and Vidanga (*E. ribes*) was assessed in goats that validated its antinematodal activity [36].

Antihyperhomocysteinemic activity: Aqueous extract of *E. ribes* administered (dose -100 & 200 mg/kg p.o) for total days of 30 in the hyperhomocysteinemic rats that showed homocysteine decrease levels and significant rise in the HDL-C levels of serum [37].

Toxicology

It have not showed any toxicity on 2000mg/kg^[38] however there were a report published about natural occurring *E. ribes* produced adverse reaction in Ethiopian population^[39].

Conclusion

As a whole, this study documents the interrelation among traditional practices, phytochemistry, pharmacological properties and toxicity. Its recent ethnomedicinal survey showed *E. ribes* to be a red listed and an essential indigenous medicament herb used for the complaints namely anxiety, convulsion, cardiac, diabetics, helminthic, bacterial, nematodal, and Molluscicidal diseases and disorder of Asian countries. Different studies (*in vitro* and *in vivo*) using *E. ribes*'s fruits, berries, extracts, leaves and phytochemical of *E. ribes* showed its realistic approach regarding so many traditional medicaments applications. The Current documented pharmacological studies have been highlighted on evaluating the analgesic activity, antioxidant activity, antidiabetic activity antitumor activity, anti-bacterial activity, anthelmintic activity, anticonvulsant activity, anti-cancer activity, antifungal activity, molluscicidal activity, antinematodal activity, antifertility activity antihyperhomocysteinemic activity. Extracts and fruits of *E. ribes* illustrated valuable organic potency, that can be utilized in upcoming era keeping in view of various clinical uses. Apart from this, the more detail researches are still needed to validates the pharmacodynamics, pharmacokinetics, and also the systemic progressions of *E. ribes* so that its beneficial medicaments explores and clinical application could be pin-pointed.

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