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ORIGINAL RESEARCH ARTICLE

Pharmacognostical and Preliminary Phytochemical Investigation of Embelia ribes Burm f

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ABSTRACT

Embelia ribes burm f. is a struggling shrub, almost a climber and has been used as anthelmintic, carminative and stimulant, it is also used in treatment of abdominal disorders, lung diseases, constipation, indigestion, fungus infections, mouth ulcer, sore throat, pneumonia, heart disease and obesity. The present study was carried out to investigate morphological, microscopical, physicochemical and phytochemical screening of Embelia ribes fruits and powder. Morphological studies showed the presence of various diagnostic characters. In the microscopical studies, churna showed the presence of Stone cells of the mesocarp, sclerieds of the mesocarp, epicarp in surface view with striated cuticle, perisperm cells and cells of endosperm filled with aleurone grains and fixed oil. Ash value, extractive value, foreign organic matter and moisture content were determined for quality standard of drugs. Phytochemical investigation shows the presence of alkaloids, carbohydrate, saponins, phenolic compounds and tannins, proteins, oil and fats and mucilage. The result of the study could be useful for identification and preparation of monograph of the plant.

KEY WORDS: *Embelia ribes*, Pharmacognostic, Phytochemical screening.

INTRODUCTION

Embelia ribes burm f. also known as Vidanga is one of the oldest herbs in Indian traditional medicine. Embelia ribes have a long history of use in ayurvedic system of medicine in various forms like churna, asava, aristha, lauha and taila. It is an Indo-Malaysian species, mainly found in India, Sri Lanka, Singapore, and Malaysia. In India it is majority found in central and lower Himalayas, Arunachal Pradesh, Assam, Bengal, Orissa, Andhra Pradesh and Madhya Pradesh [1]. It is available throughout India up to an altitude of 5000 feet [2].

Vidanga is a struggling shrub, almost a climber. The roots are brownish gray, with hairy reddish roots. The stem is whitish gray, studded with lenticels with a mature girth of 45-72 cm. Leaves are coriaceous, elliptic, lanceolate 6-14 am long and 2-4 cm broad, alternating, acuminate entire, perfectly glabrous and petiole 1-0.8 cm marginated. Flowers are pentamerous, minute, white or yellow. Fruits are as small i.e. 2.4-4 mm in size, ovate to subglobular tapped with style, smooth, succulent, in dry condition with wrinkles with loss of calyx. The seeds are reddish in colour but they become slightly black as time passes. Seeds are enclosed in brittle pericarp, covered by thin membrane and when this is taken off; the seeds are seen covered with light spot which disappear after immersion in water. The seeds are horny, depressed at the base and has ruminated endosperm. Taste is aromatic and astringent, with a slight pungency. The fruits, leaves and roots are used to cure various diseases [2].

It is mainly used as an anthelmintic, carminative and stimulant. It is also used in treatment of abdominal disorders, lung diseases, constipation, indigestion, fungus infections, mouth ulcer, sore throat, pneumonia, heart disease and obesity [3].

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The main active component is Embelin, chemically 2, 5-dihydroxy-3-undecyl-1,4-benzoquinone. Embelin is occur in golden yellow needles and is insoluble in water but soluble in alcohol, chloroform and benzene. Other components are christembine, qercitol, vilangin and resinoid [4].

The objective of the present study was to establish various Pharmacognostic standards and to evaluate preliminary phytochemical and physicochemical analysis that can facilitate identification and assist in the preparation of monograph of the plant.

MATERIALS AND METHODS

Plant material

The dried fruits of Embelia ribes were collected from local market of Guwahati, Assam in the month of November. The collected fruits of Embelia ribes were authenticated at Botanical survey of India, Pune. The shade dried powder was used for the determination of macroscopic, microscopic, physicochemical parameters and phytochemical screening.

Macroscopical studies

The fresh fruits of Embelia ribes were subjected to macroscopical studies which comprised of organoleptic characteristics of the drug viz., size, colour, odour, taste, smell, texture, fracture etc.

Microscopical studies

Qualitative microscopic evaluation was carried out by taking transverse sections of fruit of Embelia ribes. Free hand section of softened fruit were boiled with chloral hydrate to remove all the coloring matter and then carefully stained with phloroglucinol and hydrochloric acid. The sections were transferred to mounted (glycerin) on a slide and a cover slip was placed over it. Powder characteristics of Embelia ribes fruit powder were also studied using reported method [5].

Physicochemical parameters

Various physicochemical parameters such as total ash, water soluble ash, acid insoluble ash, water extractable matter, alcohol extractable matter, foreign matter, moisture content, swelling index and foaming index were calculated [6,7].

Preliminary phytochemical screening

The aqueous and alcoholic extracts were subjected to qualitative chemical examination for the identification of various plant constituents. Following tests were performed

Tests for Carbohydrates and Glycosides

200 mg of aqueous extract was dissolved in 5ml of distilled water and this solution was subjected to Molisch test for the detection of carbohydrates.

Small portion of the extract was hydrolyzed with dilute hydrochloric acid for few hours in water bath and was subjected to Liberman-Burchard's test, Legal's and Borntager's test to detect the presence of different glycosides. Another small portion of extract was treated with Fehling's reagent, Barfoed reagent to detect the presence of various sugars. For the detection of saponin glycosides, Foam test and Hemolytic tests were carried out [8, 9].

Tests for phytosterols

The alcoholic extract was refluxed with alcoholic Potassium hydroxide till complete saponification. The saponified mixture was diluted with distilled water and extracted with ether. The ethereal extract was evaporated and the residue (unsaponifiable matter) was subjected to Liberman Burchard's test [8, 9].

Tests for protein and free amino acids

A small quantity of alcoholic extract was dissolved in few ml of water and was subjected to Millon's test, Biuret test and Ninhydrine test [8, 9].

Tests for phenolic compounds and tannins

Small quantities of alcoholic extracts were treated with 5 % $FeCl_3$ solution, 1 % of gelatin containing 10 % NaCl, 10 % lead acetate and aqueous bromine solution for the detection of phenolic compounds and tannins [8, 9].

Tests for alkaloids

The small portion of dried alcoholic extract was stirred with a few drops of dilute Hydrochloric acid and was filtered. The filtrate was tested with various alkaloidal reagents such as Mayer's reagent, Dragendroffs reagent, Hager's reagent, Wagner's reagent [8, 9].

Test for gums and mucilage

10 ml of aqueous extract was added to 25 ml, of absolute alcohol with constant stirring, the precipitate obtained was examined for its swelling properties and for the presence of carbohydrates [8, 9].

Test for fixed oil and fats

Few drops of 0.5 N alcoholic potassium hydroxide was added to a small quantity of benzene extract along with a drop of phenolphthalein. The mixture was heated on water bath for 1-2 hrs. Formation of soap or partial neutralization of alkali indicated the presence of fixed oil and fats [8, 9].

RESULT AND DISCUSSION

Macroscopical studies

The macroscopic character was useful in quick identification of plant material and also serves as an important standardization parameter. The Embelia ribes fruits are blackish brown colored with 2.4-4mm size, sub globular shape, distinct odour, astringent taste and wrinkled textured as shown in (**Figure.1**). The organoleptic evaluation of Embelia ribes fruit were showed in (**Table1**).

Figure 1: Dried fruits of Embelia ribes

Table 1: Organoleptic evaluation of Embelia ribes fruits

Size	2.4-4 mm
Color	Blackish brown
Shape	Sub globular
Odour	Distinct
Texture	Wrinkled
Taste	Astringent

Microscopical studies

The microscopical studied showed the TS of the fruit is circular with distinct grooved and ridged outline. The mesocarp is encircled by a narrow layer of epicarp, transverse by groups of stone cells and vascular strands. Underneath this mesocarp lies a layer of dark brown colored, stony endocarp. Seed is circular, occupies the major portion of the fruit, exhibiting 3-4 very dark brown inward intrusions of the perisperm inside the white endosperm. Embryo is small and it lies at the centre.

Microscopic examination of the powder sample shows the presence of following

- Stone cells of the mesocarp
- Sclerieds of the mesocarp
- Epicarp in surface view with striated cuticle
- Dark brown colored cells of perisperm
- Cells of endosperm filled with aleurone grains and fixed oil
- Dark brown colored palisade like cells of the endocarp

Physicochemical parameters

The determination of physicochemical parameters is important in determination of adulterants and improper handling of drugs. (**Table 2**) shows the results of various physicochemical parameters of powdered drug carried out using standard methods.

Moisture content of drugs could be at minimal level to discourage the growth of bacteria, yeast or fungi during storage. Ash values used to determine quality and purity of crude drugs. It indicates the presence of various impurities like carbonate, oxalate and silicate. The acid insoluble ash consist mainly silica and indicate contamination with earthy material. The water soluble ash is used to estimate the amount of inorganic elements present in drugs.

The extractive values are useful to evaluate the chemical constituents present in the crude drug and also help in estimation of specific constituents soluble in a particular solvent.

Table 2: Physicochemical parameters of Embelia ribes fruit powder

Physicochemical parameters	Mean (mg/gm)	SD	SE	%RSD
Total ash	48.6	0.07	0.085	0.144
Water soluble ash	13.88	0.151	0.130	1.09
Acid insoluble ash	12.49	0.546	0.355	4.37
Water extractable matter	91.45	0.940	1.122	1.02
Ethanol extractable matter	111.15	1.434	1.432	1.29
Loss on drying (100-1050C)	25.3	0.0036	0.004	1.42
Swelling Index	2.95	0.0057	0.0081	0.195
Foaming Index	<100	0	0	0

Note- The results are mean of 3 determinations

Preliminary phytochemical screening

For preliminary phytochemical screening, the aqueous and alcoholic extracts were subjected to qualitative chemical test to determine the presence of various phytoconstituents like alkaloids, carbohydrate, saponins, phenolic compounds and tannins, proteins, oil and fats and mucilage. The results are shown in (**Table 3**).

Table 3: Qualitative Phytochemical Screening of Embelia ribes fruit powder

Test for	Observation
Reducing sugars	+ve
Non-reducing polysaccharides Rides	-ve
Gums	-ve
Mucilage	+ve
Proteins	+ve
Amino acids	+ve
Fats and oils	+ve
Steroids	-ve
Glycosides	-ve
Saponin	+ve
Flavonoids	-ve
Alkaloids	+ve
Tannins	+ve
Volatile oil	-ve

CONCLUSION

In present investigation various standardization parameters such as macroscopical, microscopical, physicochemical parameters and phytochemical screening of Embelia ribes Burm f was carried out. As our source of knowledge, Ayurveda, siddha and other Indian traditional systems of medicine, identification of plant has become a major hurdle. There are controversial identities of many plants. In this scenario, anatomical studies have become mandatory for proper identification. Thus, our study is an important landmark in correct identification of Embelia ribes.

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