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Review Article

A review: Phytochemical and pharmacological analysis of medicinal plant

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ABSTRACT

Syzygium jambolanum (L.) is a popularly employed for medicinal plant for the treatment of various affilictions. The plant restrains glucoside, ellagic acid, isoquercetin, kaempferol, anthocyanins and myricetin as its primarily active constituents. These active constituents isoquercetin, kaempferol tituents impart multiple pharmacological activities to the plant which includes antidiabetic, antioxidant, antibacterial and antifungal activity. The present review confers precise information on phytochemical constituents, traditional uses and pharmacological actions of *S. jambolanum* (L.).

1. Introduction

Due to increase in use of herbal drugs in past few decades its safety issues are of major concern. Herbal drugs can be contaminated by various pathogenic and non pathogenic microorganism in both pre and post harvest stage i.e. due to handling by personnel who are infected with pathogenic bacteria during harvesting and post harvest processing and the drug manufacturing process.

Limyati and Juniar, 1998; Bahri et al., 2001 and Govender, 2006 [1–3] assessed the microbial quality of herbal drugs. Their studies showed the presence of bacteria as well as fungi in their tested samples. Kulkarni et al. (2010) [4] studied microbial contamination in commercial herbal oral medicinal liquids. None of the ten samples of herbal medicinal liquid oral samples could pass the microbial limits led down by WHO. Amla Juice, Ginger lemon juice and Punarwin liquid could not pass the limit tests for *Pseudomonas* whereas Compound Adulsa syrup, Amla juice and Ginger Lemon juice failed to pass the test for *Staphylococcus*. Singh et al., 2012 [5–7] isolated actinomycetes from ayurvedic drugs. Although these contamination can be reduced by chemical preservatives but the repeated use of these chemical can be responsible for resistance in microorganism against those chemical as well as their accumulation can be injurious for human concern (Bialonska et al., 2010). [8] Therefore, a day's main focus is on natural preservative which can be attained through plant extracts which are regarded as safe and easily degradable and having antimicrobial and antioxidant properties through which the shelf life of drugs can be increased.

Antimicrobial activity of plant extract against various pathogens has been demonstrated by many researchers (Bereksi et al., 2018; Abbassi & Hani, 2011; Abu- Shanab et al., 2005). [9–11] Tzortzakis & Economakis, 2007; Oloyede, 2009 [12,13] discussed about the antifungal and antibacterial properties of lemon grass. The plant extracts exhibited the inhibition effects against various pathogens which can be responsible for various diseases. Uzama et al., 2011 & Ewansiha et al., 2012 [14,15] assessed the antimicrobial properties of medicinal plants. Their studies were based on the inhibitory effects of medicinal plants against gram negative and gram positive bacteria. The MIC of the crude extracts was ranged between .01 & 2.5 mg/ml while

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MBC range between 0.02 & 2.5 mg/ml. Chandrasekaran and Venkatesalu, 2004 & Shihabudeen et al., 2010[16,17] evaluated antimicrobial and antifungal activity of medicinal plant.

Therefore, present review was aimed to explain the chemical profiling of *S. jambolanum.*

2. Plant Profile

2.1. Syzygium jambolanum

Classification	
Kingdom	Plantae
Order	Myrtales
Family	Myrtaceae
Genus	*Syzygium*
Species	*jambolanum*

Syzygium jambolanum is commonly known in Brazil as 'jambolão', in India as Naval pazham and in English speaking countries as jambolan, sweet olive or java plum, found through out India and is well known for its edible fruits and medicinal value.

2.2. Commonname

Syzygium jambolanumis also known as jambul, jamun, jambu, java plum, jamblang, jambolan, kalojaam, black plum, damson plum, duhat plum, jambolan plum, Portuguese plum, Malabar plum.

Chemistry	
Nutritional value per	100 g
Energy	251 kJ (60 kcal)
Carbohydrates	15.56 g
Fat	0.23 g
Protein	0.72 g
Water	83.13 g
Vitamin A	3 IU
Thiamine (Vit. B1)	0.006 mg (0%)
Riboflavin (Vit. B2)	0.012 mg (1%)
Niacin (Vit. B3)	0.260 mg (2%)
Pantothenic acid (B5)	0.160 mg (3%)
Vitamin B6	0.038 mg (3%)
Vitamin C	14.3 mg (24%)
Calcium	19 mg (2%)
Iron	0.19 mg (2%)
Magnesium	15 mg (4%)
Phosphorus	17 mg (2%)
Potassium	79 mg (2%)
Sodium	14 mg (1%)

Compound	**Percent**
Crude Protein	9.1
Fat	4.3
Crude Fiber	17.0
Ash	6.0
Calcium	1.3
Phosphorus	0.19

2.3. Java plum leaf

Constituents are essential oil, chlorophyll, fat, resin, gallic acid, tannis alumen. Jamun contains phenols, tannins, alkaloid, triterpenoids, and volatile oil.

2.4. Occurrence and distribution

The original home of jamun is India, distributed throughout India, in forest up to 1800m usually along the bank and moist localities, also cultivated as shade trees along road sides. It is widely cultivated in Haryana as well as the rest of the Indo- Gangetic plains on a large scale. Its habitat starts from Myanmar and extends up to Afghanistan. It is also found in Thailand, Philippines, Madagascar and some other country. The plant has been successfully introduced into many other tropical countries such as the West Indies, West Africa and some sub tropical regions including Florida, California, Algeria and Israel. It was cultivated in England by Miller (Ivan., 1999).[18,19]

Phytochemical Screenings: The leaf extracts of Syzygium cumini were analysed for the presence of flavonoids, alkaloids, glycosides, steroids, phenols, saponins, terpenoid, cardiac glycosides and tannins according to standard methods.

1. Alkaloids [Mayer's test]: 1.36gm of mercuric chloride dissolved in 60ml and 5gm of potassium iodide were dissolved in 10 ml of distilled water respectively. These two solvents were mixed and diluted to 100ml using distilled water. To 1ml of acidic aqueous solution of samples few drops of reagent was added. Formation of white or pale precipitate showed the presence of alkaloids.
2. Flavonoids: In a test tube containing 0.5ml of alcoholic extract of the samples, 5 to 10 drops of diluted HCl and small amount of Zn or Mg were added and the solution was boiled for few minutes. Appearance of reddish pink or dirty brown colour indicated the presence of flavonoids.
3. Glycosides: A small amount of alcoholic extract of samples was dissolved in 1ml water and then aqueous sodium hydroxide was added. Formation of a yellow colour indicated the presence of glycosides.
4. Steroids [Salkowski's test]: About 100 mg of dried extract was dissolved in 2 ml of chloroform. Sulphuric acid was carefully added to form a lower layer. A

reddish brown colour at the interface was an indicative of the presence of steroidal ring.

5. Cardiac glycosides [Keller killiani's test]: About 100 mg of extract was dissolved in 1ml of glacial acetic acid containing one drop of ferric chloride solution and 1ml of concentrated sulphuric acid was added. A brown ring obtained at the interface indicated the presence of a de oxy sugar characteristic of cardenolides.
6. Saponins: A drop of sodium bicarbonate was added in a test tube containing about 50 ml of an aqueous extract of sample. The mixture was shaken vigorously and kept for 3min. A honey comb like froth was formed and it showed the presence of saponins.
7. Resins: To 2 ml of chloroform or ethanolic extract 5 to 10 ml of acetic anhydrite was added and dissolved by gentle heating. After cooling, 0.5 ml of H_2SO_4 was added. Bright purple colour was produced. It indicated the presence of resins.
8. Phenols [Ferric Chloride Test]: To 1ml of alcoholic solution of sample, 2 ml of distilled water followed by a few drops of 10% aqueous ferric chloride solution were added. Formation of blue or green colour indicated the presence of phenols.
9. Tannins [Lead acetate test]: In a test tube containing about 5 ml of an aqueous extract, a few drops of 1% solution of lead acetate was added. Formation of a yellow or red precipitate indicated the presence of tannins.
10. $FeCl_3$ test: A 2ml filtrate [200 mg of plant material in 10ml distilled water, filtered], and 2ml of $FeCl_3$ were mixed. A blue or black precipitate indicated the presence of tannins.(Harborne., 1928).[20]

2.5. Clinical Reports of its Medicinal Significance

2.5.1. Anticarcinogenic effects Animal data

Detailed literature survey showed that no much works has been reported regarding anticancer potency of *S.jambolanum*. Report says that pulp extract at higher concentration is capable of retarding the proliferation of several cancer cells such as MCF-7, HeLa, HEP G2, HL60 and U251 *in vitro* (Nazif, 2007). *S.jambolanum* inhibits growth and induces apoptosis of human breast cancer but not non tumorigenic breast cells.

2.5.2. Anti-inflammatory

S.jambolanum was found to have anti-inflammatory activity. Chloroform extraction of S.*jambolanum* seeds was reported to inhibit carrageenan, kaolin and other mediator induced oedema in experimental animals. The extract also inhibited potency to inhibit inflammation, migration of leucocytes, granuloma formation (Chaudhuri et al., 1990).[21]

2.5.3. Antioxidant action

In vivo and in vitro antioxidant activities of various extracts from *S.jambolanum* fruit, its anatomical parts viz. pulp, kenel and sed coat have been reported. Aqueous extract of *S.jambolanum* has been reported to inhibit plasma oxidative stress and ameliorate antioxidant status by increasing expressions of endogenous antioxidant enzymes several folds above the base line (Prince and Menon, 1998).[22] However comprehensive plant antioxidant activity evaluation of fruits based on anatomical parts, and fractions have not been reported.

2.5.4. Diabetes

Insulin secretion was found to be stimulated on incubation of plant extract with isolated islets of Langerhans from normal as well as diabetic animals. These extracts also inhibited Insulinase activity from liver and kidney. There is number of reports on the antidiabetic properties of seed than that of pulp. *S.jambolanum* seed aqueous extract has been studied for the capacity to ameliorate glucose metabolizing enzymes in alloxan induced diabetic rats (Prince et al., 1997).[23]

2.5.5. Polyuria

The powder of seeds is valuable in polyuria or production of excess urine.

2.5.6. Diarrhoea and dysentery

Powder of seed is an effective remedy for diarrhoea and dysentery. About 5 to 10 gm of this powder should be taken with butter milk in these conditions. Infusion of the tender leaves, which contain a high concentration of gallic acid, tannic acid is also given as a medicine in diarrhoea and dysentery.

2.5.7. Liver disorders

Natural acids in the jambul fruits play an important role in the secretion of digestive enzymes and stimulate the liver functions. Charaka, the well known physician of the ancient India, used this fruit in the treatment of enlargement of the liver.

2.5.8. Female sterility

An infusion of fresh tender leaves of jambul fruit, taken with honey or butter milk, is an effective remedy for sterility and miscarriage due to ovarian or endometrium functional disorder.

2.5.9. Piles

The jambul fruit is an effective food remedy for bleeding piles. Fruit should be taken with salt every morning for two or three months in its season.

2.5.10. Antimicrobial activity

This species, from the myrtle family (Myrtaceae), has been used to treat illnesses caused by bacterial, fungal and viral pathogens (Kusumoto et al.,1995),[24] ulcers in genitourinary tract caused by Candida albicans, as well as cold, cough, fever and skin problems such as rashes and the mouth, throat and intestines. In India, it has been used, in a mix with honey or milk, to treat diabetes and digestive diseases and the fresh fruits has been taken orally to treat stomachache (Duraipandiyan et al., 2006).[25] The antimicrobial activity of *S. jambolanum* has been confirmed in vitro by some authors using bacteria strains (Djipa et al., 2002; Shafi et al., 2002)[26,27] or Leishmania promastigotes (Bezerra et al., 2006).[28] However, there are no results about the effect of this species on the in vivo bacterial infection. The leaves are used to reduce blood glucose level in traditional practices and possess antibacterial and fungicidal activity (Joshi,2000; Chandrasekaran and Venkatesalu, 2004).[16,29]

3. Conclusion

Herbal drug contamination can be caused by many pathogenic microorganisms. Prevention of quality degradation of drugs can be achieved by chemical preservatives but due to adverse effect of these chemicals on human health, the demand of natural preservatives increased. The compound of plant extacts (*S. jambolanum*) which are potentially active as antimicrobial agent as well as natural preservative can be added in herbal drugs to prevent the drug contaminants and enhance the shelf life of herbal drug and the application of chemical preservative will also be avoided.

4. Source of Funding

None.

5. Conflict of Interest

None.

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