



Phytochemical Analysis and Antimicrobial Activity of *Jatropha curcas*

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ABSTRACT

Medical plants have bioactive compounds which are used for curing various human diseases. *Jatropha curcas* has been an important herb in the ayurvedic and indigenous medical system. The present study was designed to investigate the phytochemical screening and antimicrobial activities of *Jatropha curcas* leaf extracts. To validate this, the leaf powder of the plant was subjected to preliminary phytochemical analysis and in vitro antibacterial activity against *Staphylococcus aureus* and *E. coli*. The *Jatropha curcas* leaf extracts showed antimicrobial activity. The phytochemical screening revealed the presence of flavonoids, carbohydrate, protein, and saponins in the extracts of leaf powder of *Jatropha curcas*.

Key words: *Jatropha curcas*, leaf extract, antimicrobial activity, phytochemicals

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INTRODUCTION

Medicinal plants are the sources to cure diseases since ancient times and have been used as a source of drug. The plant derived medicines have extraordinary contribution to human health, and have delivered a source of developing contemporary medicines and drugs and developments of new prescriptions [1]. Moreover, numerous active complex compounds found in medicinal plants act as abundant resource of energetic compound used for food industries and medicinal purpose [2]. *Jatropha curcas* played key role in the cure of several fungal and bacterial diseases [3]. The generic name of *Jatropha curcas* originates from two Greek words Jar's means doctor and troph'e means food[7]. The research on medicinal plants led to widely spread public interest and development [8]. *Jatropha curcas* leaves are very use full both in agriculture and economic resources, improvement of new complex compounds [6].

Jatropha curcas contains various fats compounds such as saturated, unsaturated, and polysaturated fatty acids which have segment of oil mainly palmitic acid, steric and unsaturated fatty acids [5]. Various bioactive compounds tannins, phytosterol, glycosides, phenolic compound, flavonoids, sapogenins and steroidal exhibit extensive range of medicinal potential of plant [6, 4]. Phytochemicals also contain different compounds such as total, sugars, amino acids, protein, and phenolic compound such as terpenoids, and alkaloids [3]. It provides definite physiological actions to human bodies because plants have bioactive phytochemicals constituents used for the medicinal purpose[2, 4, 5].

MATERIAL AND METHODS

The *Jatropha curcas* plant was collected from the Shivam Nursery, Tambve, District Sangli, Maharashtra, India. The leaves were washed 2-3times with running water and dried. Then the leaves were crushed by mortal-pestle to form the leaf powder. This leaf powder (10 g) was suspended in 100 mL of distilled water. This mixture was allowed to settle in test tubes. Supernatant was used for the study of antimicrobial activity. Pure bacterial cultures viz. *Staphylococcus aureus* and *Escherichia coli* were used as test organism. For cultivation of *Staphylococcus aureus*, sterile nutrient agar was prepared. However, for the cultivation of *E.coli* sterile MacConkey's agar plates were prepared. After the solidification of poured plates, the suspension of test microorganisms was spreaded on these plates in triplicates. The three wells were prepared by cork borer in each agar plates. 200 uL of the extract obtained from leaf powder were added in each well separately. The plates were kept in freeze for about 15 min for proper diffusion. After

diffusion plates were incubated at 37°C for 24 h. After incubation plates were observed for zone of inhibition around the respective wells [8].

For phytochemical analysis, various analytical methods were used.

1. Alkaloids – For detection of alkaloids, Meyers test was used. Few drops of Meyers reagent were added to 1 ml of leaf extract and observed for formation of yellowish or white precipitate.
2. Flavonoids – 1ml of leaf extract was mixed with few drops of dilute NaOH solution. The tube was observed for formation of intense yellow color. The solution was observed for disappearance of colour after addition of few drops of dilute acid.
3. Glucosides- Borntrager’s test was used for detection of glucosides. 1 ml of leaf extract was mixed with 5 ml of dilute HCl, boiled in water bath for 10 minutes and filtered. The benzene extract of the filtrate was mixed with ammonia solution. The tube was observed for formation of pink or red colour.
4. Protein – The leaf extract was mixed with 1 % Ninhydrin solution & observed for formation of deep blue colour.
5. Carbohydrate – The leaf extract was mixed with 1 % Molisch reagent and then few drops of concentrated H₂SO₄ and observed for formation of purple colour.
6. Steroid content – Steroid content was determined by Salkowski’s test. 2 ml of extract was mixed with chloroform. The chloroform layer was added with 1 to 2 drops of concentrated H₂SO₄ and observed for formation of red color.
7. Tannins – The addition of blackish blue colour after addition of ferric chloride solution indicated the presence of tannins.
8. Terpenoid test - 5 ml extract was mixed with chloroform and concentrated sulphuric acid and observed for development of reddish brown color.
9. Saponins – Saponin content was detected by Near Infra-Red Spectroscopy.
10. Gums and mucilage content- It was determined by O toluidine test.

RESULT AND DISCUSSION

Antimicrobial activity of the aqueous extract of the leaf powder of *Jatropha curcas* is described in the table 1. The aqueous extract showed the considerable inhibitory effect against *E.coli* and *Staphylococcus aureus*. The selection of this plant for the present study was based on its medicinal properties and its use in traditional system. The present study clearly implies that the selected plant leaf extract can cure the sort of illness concerned with respective organisms. Thus, it has the potential to be used for medicinal purposes or antimicrobial natural additives in cosmetic & food industries or as safe alternatives to synthetic antimicrobial drugs. The phytochemicals analysis was done to observe presence of alkaloids, carbohydrates, phenolic compounds, proteins, saponins, steroids, tannins and terpenoids, each compound has medicinal activity. In present study, tannins [41.02mg/g] and steroids (56mg/g) were found in high quantities. According to Sumathi and Sanghavi (2016), tannins and steroids have various medicinal values. Tannins so have antioxidant, anticancer and antimicrobial activities. Saponins which are glycosides have been found to have inhibitory effects on Gram-positive organisms such as *S. aureus*.

Table 1: Antimicrobial study of *Jatropha curcas*

S. No.	Name of the organism	Zone of Inhibition (mm) [Average of triplicates]
1	<i>E. coli</i>	14
2	<i>Staphylococcus aureus</i>	12

Table 2: Phytochemical analysis of *Jatropha curcas*

S. No.	Phytochemical	Subtest	Result
1	Alkaloids	Mayer’s test	Positive
2	Flavonoids	Alkaline reagents Lead acetate	Positive
3	Glucoside	Borntrager’s test	Negative
4	Protein	Ninhydrin test	Positive
5	Carbohydrate test	Molish’s test	Positive
6	Steroid test	Salkowski’s reaction	Positive
7	Tannins	Ferric chloride test	Positive
8	Terpenoids	Salkowski’s reaction	Positive
9	Saponins	NIRS	Positive
10	Gums and mucilage	O toluidine test	Positive

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