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Pharmacological profile and phytochemical investigation of *syzygium caryophyllifolia* leaf extracts

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ABSTRACT

Present research work was subjected to deals with phytochemical study of extracts of newly identified plant *Syzygium caryophyllifolia* from Chandrapur forest region and also tested for antimicrobial activity against gram positive, gram negative and fungi. Extracts of leaves of plant was prepared in ethanol and ethyl acetate and tested for various biologically active constituents like alkaloid, terpenoid, flavonoid, tannine, saponnin, glycosides, steroids etc. The study revealed the presence of some biologically active component in the plant extract and also suggested that the leaves of *Syzygium caryophyllifolia* have promising biological activity against microorganism.

Keywords: *Syzygium caryophyllifolia*, Mediciinal Plants, Phytochemical

INTRODUCTION

It is well known that plants and animals are the biggest source of biologically active medicinal compounds for mankind. Plants are natures "chemical factories" providing richest source of organic chemical on the earth. Most of the medicinal plants from this forest are used in traditional medicine to cure various sicknesses and diseases. Indian forest is rich in variety of medicinal plants, most of plants species have high potential abilities in ayurveda, unani, siddha, traditional medicines. Only very few have been studied phytochemically and pharmacologically for their potential medicinal values. Forest of Chandrapur is known for their biodiversity in flora and fauna and also having variety of medicinal plants. The indigenous system of medicine namely Ayurveda, Unani and Siddha have been in existence in several centuries (Jogi and Akkewar, 2012). *Syzygium cumini* is one of the well know plant used for various disease particularly diabetes. All parts including roots, leaves, stem, fruits and flowers have been used in curing various diseases (Reynestson et al., 2005).

It is widely distributed throughout India and ayurvedic medicine (Indian folk medicine) mentions its use for the treatment of diabetes mellitus.

During an ethno-botanical exploration of Chandrapur District of Maharashtra State, a plant was noted 7 km away from Chandrapur City in Lohara Village which the local people call as "ChotaJambhul". The flowering twigs of the plant were collected and after referring to the pertinent literature (Almeida, 1996), it was identified as *Syzygium caryophyllifolia* (Lamk.) DC family Myrtaceae. This variety named as *Syzygium caryophyllifolia* (Lamk.) DC till not studied for chemically and pharmacologically. This paper deals with phytochemical screening and biological study of ethanol and ethyl acetate extract of leaf of *Syzygium caryophyllifoli.*

MATERIALS & METHODS

Plant Collection: The present work was carried out at Department of chemistry, J.M.V. Chandrapur, Gondwana University, Gadchiroli. The plant named *Syzygium caryophyllifolia* was collected from Chandrapur forest region near Lohara village. Their botanical identity of plant was determined and authenticated from literature available in Department of Botany, J.M.V. Chandrapur. The leaves of *Syzygium caryophyllifolia* was thoroughly washed with water and dried under shade for about ten days. The dried plant sample was ground well into a fine powder in a mixture grinder. The powder was stored in an air sealed polyethylene bag at room temperature before extraction.

Preparation of Extract: The powdered plant material was extracted using Soxhlet apparatus with organic solvents ethanol and ethyl acetate. The extracts were concentrated. The extracts were stored in air tight glass container at 40 C.

Antimicrobial Screening of Extracts: The microorganism used in the study: Gram-negative E-coli, Gram-positive S-aurous and Nizer fungus Aspergillus were obtained from stock culture in the Department of Microbiology, J.M.V. Chandrapur. Susceptibility test were carried out. The modified agar well diffusion method (Garrod et al, (1981), Trease and Evans, 1989) to test the antimicrobial activity of the extracts. The medium employed was diagnostic sensitivity agar. The culture was prepared in triplicate and incubated at 37^{0}C for 24 to 72 h. 0.2 ml of the broth culture of the test organism was put in a sterile Petri-dish and 18 ml of sterile molten diagnostic sensitivity agar, was added. Well were bored into the medium using 0.1 ml of the extracts. Streptomycin and Chloramphenicol were used as the standard antimicrobial agents at a concentration of 10mcg/disk, 30mcg/disk respectively. The plates were kept in sterilized inoculation chamber for 2 h to facilitate diffusion of the antimicrobial agents into the medium. The plates were then incubated at 37^o C for 24 h and the diameter of zone of inhibition of microbial growth were measured in the plates in millimeters.

Phytochemical Analysis: The extracts were analyzed for the presence of Alkaloids, Terpenoids, Tannine, Saponin, Flavonoid, Phlobatannin, Anthraquionone, Reducing Sugar, Glycoside and Cardiac glycoside (Sofowara. 1993), Herborne, 1973), Okwu, 2001), Rahilla et al., 1994).

Alkaloid: About 0.2 g of the extracts was warmed with 2% H_2SO_4 for two minutes. It was filtered and few drops of Dragencloffs reagent were added. Orange red precipitated indicates the presence of alkaloids.

Tannine: Small quantity of extracts was mixed with water and heated on water bath. The mixture was filtered and ferric chloride was added to the filtrate. A dark green solution indicates the presence of tannins.

Anthraquinones: About 0.5 g of the extracts was boiled with 10% HCl for few minutes in a water bath. It was filtered and allow to cool. Equal volume of $CHCl_3$ was added to the filtrated. Few drops of 10% NH_3 were added to the mixture and heat. Formation of rose-pink colour indicates the presence of anthraquinones.

Glycoside: The extracts was hydrolyzed with HCl solution and neutralized with NaOH solution. A few drop of Fehling's solution A and B were added. Red precipitate indicates the presence of glycoside.

Reducing Sugars: The extracts were shaken with distilled water and filtered. The filtrate was boiled with drop of Fehling's solution for minutes. An orange red precipitate indicates presence of reducing sugar.

Saponin: About 0.2 g of the extract was shaken with 5 ml of distilled water and then heated to boil. Frothing (appearance of creamy miss of small bubbles) shows the presence of saponins.

Flavonoids: Extracts of about 0.2 g was dissolved in diluted NaOH and HCl was added. A yellow solution that turns colorless indicates the presence of flavonoids.

Phlobatannins: The extracts (0.5 g) was dissolved in distilled water and filtered. The filtrate was boiled with 2%HCl solution. Red precipitated show the presence of Phlobatannins.

Terpenoids (Salkowski test): 0.2 g of extracts was mixed with 2 ml Chloroform ($CHCl_3$) and concentrated H_2SO_4 (3 ml) was carefully added to form a layer. A reddish brown coloration of the interface was formed to indicate positive results for the presence of terpenoids.

Cardiac glycosides: Five ml of each extracts was treated with 2 ml of glacial acetic acid containing one drop of ferric chloride solution. This was underplayed with 1 ml of concentrated H2SO4. A brown ring of the interface indicates a deoxysugar characteristic of cardenolides. A violet ring may appear below the brow ring, while in acetic acid layer, a greenish ring may form just gradually throughout thin layer.

RESULTS

Phytochemical screening of ethanol and ethyl acetate extract of *Syzygium caryophyllifolia* is shown in table 1. The susceptibility of test microorganism to the crude extracts of *Syzygium caryophyllifolia* is shown in table 2.

Table-1. Phytochemical tests of various extracts of plant Syzygium caryophyllifolia.

Chemical composition	**Ethanol Extract**	**Ethyl acetate extract**
Alkaloid	+	+
Tannine	-	-
Anthroquinone	-	-
Glycoside	-	-
Reducing sugar	-	-
Saponine	-	-
Flavonoid	-	+
Phlobatannins	-	-
Terpenoid	+	+
Cardiac glycosides	+	+

Key to symbols: - = Absent, + = present

Table-2. Antimicrobial activity of various extracts of *Syzygium caryophyllifolia*.

Extracts	Microorganism		
	Gram + (S aureus)	Gram – (E coli)	Nizer fungus Aspergill
Ethanol extract	-	-	+++
Ethyl acetate extract	+++	-	+++

Key to symbols: - = Inactive (inhibition zone <5 mm); + = slightly active (inhibition zone 5-10 mm); ++ = moderately active (inhibition zone 10-15 mm); +++ = highly active (inhibition zone >15 mm).

DISCUSSION

The qualitative analysis of extracts from leaf of plant *Syzygium caryophyllifolia* showed the presence of phytochemical constituents such as alkaloid, terpenoid , and Cardiac glycoside. The results are summarized in table 1 and 2. The above results indicates that, the leaves of plant investigated are rich in alkaloid, terpenoid, Cardiac glycoside and flavonoids. Ethanol and Ethyl acetate extracts showed the presence of cardiac glycoside. All extracts have showed absence of anthraquinone. Extracts of leaf were tested against Gram positive S-aurous and gram negative E-coli. Extracts also tested for antifungal activity against Aspergillus Niger and showed the inhibition of growth. Ethyl acetate extract was found to be highly sensitive against Gram positive S-aurous and Aspergillus Niger (with zone of inhibition above 13 mm means highly sensitive). Ethyl acetate extract was showed more antimicrobial activity than standard antibiotics streptomycin and chloramphenicol. Ethanol extract also showed antibacterial activity against Aspergillus Niger. The inhibitory activity of these extracts confirmed the potential use of the plant in the treatments of microbial induced ailments.

The plant studied here can be seen as a potential source of useful drugs. Further studies are going on this plant in order to isolate, identify, characteristics and elucidate the structure of bioactive compounds.

CONCLUSION

This plant is rich in presence of alkaloid, terpenoid and other biologically active class of natural products. The plant studied here can be seen as a potential source of

useful drugs. Further studies are going on this plant in order to isolate, identify, characteristics and elucidate the structure of bioactive compounds.

Conflicts of interest: The authors stated that no conflicts of interest.

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