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Screening of phytochemical and antimicrobial activity of *Melia composite* against *Enterobacter aerogenes* and *Shigilla flexneri*

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ABSTRACT

Medicinal plants are used in traditional treatments to cure variety of diseases. In the last few decads there has been an exponential growth in the field of herbal medicine. Infectious diseases caused by bacteria, fungi, viruses and parasites remain a major threat to public health. Despite tremendous progress in human medicine. Their impact is particularly great in developing countries because of the relative unavailability of medicines and the emergence of widespread drug resistance. The leaves Melia composite are useful in cough, wounds, ulcer, cold, sores, skin diseases, itches etc. Base on the above information the present work is aimed screen the phytochemicals and to analysed the antimicrobial activity against Enterobacter aerogenes and Shigilla flexneri. In the study, as saponin, tannins, flavanoids, carbohydrates, amino acids and protein were present in both aqueous and methanol extracts. Shigilla flexneri showed significant zone of inhibition in methanolic extract when compared to aqueous extract, Enterobacter aerogenes showed no significant difference between aqueous and methanolic extract. From the result it is concluded that both methanol and aqueous extracts shows the presence of majority of phytoconstituents and anti microbial activity. Hence this plant was may selected for the pharmacological studies. Further studies are needed to identity the pure component and establish the extract mechanism of action for antibacterial action of the plant extract.

Key words: *Melia composite*, human medicine, phytoconstituents, antibacterial.

INTRODUCTION

Plants are the major source of medicine which having nutritive values. The medicinal value of these plants lies in phytochemical constituents that cause definite pharmacological action on the human body [1] It is tremendous progress in human medicine, due to the threat to public health, by infectious diseases caused by bacteria, fungi, viruses and parasites. The usage of medicinal plant is more important in developing countries because of the relative unavailability of medicines and the emergence of widespread drug resistance [2].

Plant derived natural products have received considerable attention in recent years due to their discuss pharmacological articles .All plants containing active compounds are important. The beneficial medicinal effect of plant materials typically result for the combination of secondary products present in the plant. In plants, these compound are mostly secondary metabolites such as alkaloids, steroids, tannins and phenol compounds, which are synthesized and deposited in specific parts or in all part of the plant. These compounds are more complex and specific and are found in certain taxa such as family, genus and species, but heterogeneity of secondary compounds in found in the wild species [3].

The use of traditional medicines is increasing and getting popularly throughout the developed and developing world [4]. Herbal medicines are the finished labeled medicinal product that contains active ingredients, aerial or underground parts of the plant or other plant material or combinations [5-8]. About 80% of the marginal people developing countries rely on traditional medicine for their primary health care [9], with the increase in people's preference and demand, worth of herbal product industry is increasing day by day [10-12].

Melia composite is traditionally been used as anthelmintic, antilithic diuretic, emmenagouge, asbungent and stomachi. Various scientific studies reported the analgesic, anticancer, antivirul, antimalarial, antifeedent and antifertility activity of this plant [13]. Antibacterial constituents of medicinal plants and their use for the treatment of microbial infection as possible alternatives to synthetic drug to which many infection microorganism have become resistant seem to very much promising [14].

This plant might possess antibacterial properties; hence present study aim to analyse, the phytochemical screeing, isolation of compound and antimicrobial activity of *Melia composite* aqueous and methanolic leaf extract against the bacterial stains.

EXPERIMENTAL SECTION

The fresh leaves of *Melia composite* plant were collected from in and around Thanjavur District, Tamilnadu, India.

Preparation of extract
The plant material was shade dried for three days. After drying, plant material is powdered with the help of mixer grinder. Twenty gram of powdered plant material was mixed with 100ml solvent like aqueous and methanol. The extracts prepared in succession from powdered leaf material by soxhlet method [15]. The collected extracts stored in a vial for further studies.

Phytochemical screening
The aqueous extracts were subjected to phytochemical screening for secondary plant metabolites according to the methods described by [16-19].

Test microorganism
Disease causing infectious bacteria in animal and human such as *Enterobacter aerogenes* and *Shigilla flexneri* were used in present study. They were collected from the Microbial Type Culture Collection (MTCC) at Chandigarh, India.

Antimicrobial activity
Antibacterial assay was carried out by agar diffusion method. The sterile Muller-Hinton agar plates by using separate sterile cotton swabs. The prepared sterile disc was placed on the surface of the medium at equal distance and then the plate were incubated at 37^0C for 24 hours to determine the antibacterial activity of the respective solvent extract. Antibiotic (ciprofloxacin) disc (15mg/disc) were used as positive control. Each extract was treated in triplicate for calculation of mean value.

Statistical analysis
Mean and standard deviation were calculated to facilitate the comparison of the data. The obtained data were computed by ANOVA test followed by the pos hoc Duncan's test. All the data analyses were significant at $P<0.05$ [20].

RESULTS AND DISCUSSION

In the phytochemical screening of malai vembu revealed some differences in the leaf constituents were tested. The phytochemicals like such as saponin, tannins, flavanoids, carbohydrates, amino acids and protein were present in both aqueous and methanol extract, whereas terpenoids present only in aqueous extract, phytobatannins and glycosides were present only in methanolic extract (Table1). The phenol, steroids, volatile oils and hydrolysable tannins were absent in both aqueous and methanolic extract. Phytobatannins and glycosides were absent only in aqueous extract, terpenoids absent only in methanolic extract, which are supported to the results of Sumathi [21]. She revealed that alkaloids, oil, fats, carbohydrates, sterols, proteins, amino acids, tannins, glycosides, phenolic

compounds, flavonoids, gum and mucilage were present in both aqueous and methanol extract. Hence, methanol extract was selected for the isolation of the available active constituents being a bipolar solvent, which can dissolve a wide range of phytoconstituents, where as the aqueous extract contains polar compounds. The result showed that the plant has number of chemical constituents, which may be responsible for many pharmacological actions.

Phytochemical constituents such as alkaloids, flavonoids, tannins, phenols, saponins and several other aromatic compounds are secondary metabolites of plants that serve a defense mechanism against prediction by microorganisms, insects and other herbivores [22] The presence of coumarins, flavonoids, glycosides, phenols, saponins, steroids and tannins in most of the selected plant which could be responsible for the antimicrobial property. These bioactive compounds are known to act by different mechanism and exert antimicrobial actions. Saponin which is one of the active constituents involved in plant disease resistance because of their antimicrobial activity [23]. Traditionally, saponins are subdivided into triterpenoid and steroid glycoside [18]

Shigella flexneri and *Escherichia coli* shows maximum zone of inhibition in methanolic extract when compare to aqueous which is correlated to the results of evidence Horbone, 1973, he reported that leaves of *Melia azedarach L.* are effective in controlling bacterial infections caused by both gram positive and gram negative strains (Table 2, Fig 1). During these investigations it becomes clear that the most effective crude extract was ethyl acetate, which demonstrated maximum inhibition followed by methanolic fraction that inhibited the growth of all the tested human pathogens [24]. He also noticed that methanolic, ethyl acetate and aqueous extracts showed antibacterial activity against all of the pathogens. They reported that plant extracts can be effective antibiotics, both in controlling gram positive and gram negative human pathogens. The *in vitro* screening also confirms medicinal uses reported earlier [25-30]. Futher, results obtained from the present study shows the methanolic extract is appears that overall the bacteria were found to be sensitive to methonolic extracts. The reasons for this could be that the components from the plant active against microorganisms are most often obtained, through methanolic extraction. [31,32]

Table -1 Preliminary phytochemical studies on various extracts of *Melia composite* leaves powder

S.No.	Phytochemical tests	Aqueous	Methanol
1.	Saponin	+	+
2.	Tannins	+	+
3.	Phenol	_	_
4.	Steroids	_	_
5.	Terpenoids	+	_
6.	Flavonoids	+	+
7.	Amino acid and proteins	+	+
8.	Carbohydrate	+	+
9.	Phylobatannins	_	+
10.	Volatile Oil	_	_
11.	Hydrolysable tannins	_	_
12.	Glycosides	_	+

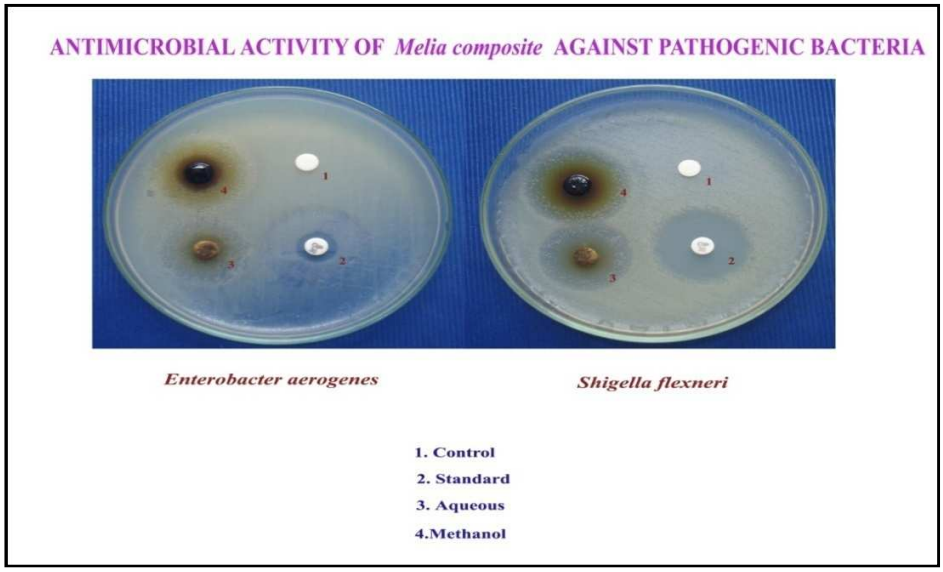
'+'- Present, '-' Absent

Table – 2. Antimicrobial activity of *Melia composite* against pathogenic bacteria

S. No.	Name of the Bacteria	Zone of inhibition mm in diameter (M±SE) (n=6)			
		Standard*	Control	Aqueous	Methanol
1	*Enterobacter aerogenes*	13.50 ± 0.56^{a}	-	15.33 ± 0.72^{ab}	18.83 ± 0.42^{b}
2	*Shigilla flexneri*	24.16 ± 0.16^{b}	-	15.00 ± 0.36^{a}	22.00 ± 0.18^{b}

** - Ciprofloxacin (disc 15mg) Ref. Hi Media Standard value*

Values are expressed in Mean ± SD and the values in horizontal rows are significantly different at P > 0.05% level



CONCLUSION

The present work concluded that screening of phytochemicals in *Melia composite* showed the presence of majority of phytoconstituents and their anti microbial activity. Hence, this plant may selected for the pharmacological studies and establish the exact mechanism of antibacterial action of this plant extract. Further studies on isolation of active constituents responsible for the activities and field trials using extract treated leaves are under investigation.

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