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In-vitro Antibacterial and Antifungal Activity of *Grewia Asiatica* Linn. Leaves

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ABSTRACT

Grewia asiatica Linn. belonging to family Tiliaceae is commonly known as Phalsa found through out India. It is an important medicinal plant used in inflammation, diabetes, fever, blood disorders, cooling agent, astringent, postural eruption etc. As a herb it is used widely in the Indian traditional system, it was thought worthwhile to undertake the standardization of its aerial parts. Evaluation of the leaves were carried out to determine the effect of various drug extract on number of microbial and fungal strain. Leaves exhibited moderate to significant antibacterial and antifungal activity against all the tested bacterial strains. The chloroform extract exhibited moderate antibacterial and antifungal activity. The petroleum ether extract was devoid of any antibacterial and antifungal activity. While mentioned all the organisms are susceptible to alcoholic as well as aqueous extracts.

Keywords: Tiliaceae, Cup plate method, Antimicrobial activity, Antifungal activity

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INTRODUCTION

Grewia asiatica Linn. belonging to family Tiliaceae is commonly known as Phalsa found throughout India. Medicinal properties of *Grewia* species includes antirheumatic, antidiabetic, hypoglycemic, antipyretic, anti-inflammatory, antioxidant, radioprotective effects, cooling effects[1,2]. Glycosides are responsible for antidiabetic activity. So, it was expected to reveal similar concrete antibacterial properties by *Grewia asiatica* Linn. to prove as a wonder drug; known but overlooked for centuries. The leaf extract revealed the presence of glycosides, flavanoids, tannins, triterpenoids etc. The enhanced antibacterial and antifungal activity of leaves was primarily due to presence of flavanoids. As per review of literature, report on antibacterial activity of *Grewia asiatica* Linn. leaves are not available[3].Thus it was sought needful to study antibacterial and antifungal activity of *Grewia asiatica* Linn. leaves.

MATERIALS AND METHODS

Materials

Aerial parts of *Grewia asiatica* Linn. herbs growing in natural habitat in Dehgam, Ahemadabad, Gujarat, India, in June, 2009 and identified by Dr. H. B. Singh, Taxonomist, NISCAIR, New Delhi. Voucher specimen of the plant (NISCAIR 1268/72) has been submitted in the institute for reference purpose. Mother culture for gram-positive *Bacillus subtilis* (ATCC6633); gram-negative *Pseudomonas aeruginosa* (ATCC25619) and Fungi- *Saccharomyces cerevisiae* were procured from Department of Microbiology, Sir P.T .Science college, Modasa, Gujarat[4,5].

Preparation of extracts

Leaves of *Grewia asiatica* Linn. was dried in shade and crushed to fine powder. The dried powder of the plant (200 g) was extracted in Soxhlet apparatus for successive extraction with Petroleum ether, chloroform, ethanol and water. The extract was evaporated to dryness by evaporation on a water bath. A semisolid brown crude extract of leaves so obtained was tested for the antibacterial and antifungal activity against various strains. Sterile nutrient agar plates were prepared.

Antibacterial and Antifungal activity by cup plate method

Evaluation of the activity was carried out by cup-plate technique using nutrient agar medium for bacteria and Sabourad's dextrose agar medium for fungus. Antibacterial and antifungal activity was measured in terms of zone of inhibition[4,6,7,8]. Bacterial strain gram-positive *Bacillus subtilis* (ATCC6633); gram-negative *Pseudomonas aeruginosa* (ATCC25619) and fungal strain *Saccharomyces cerevisiae* were used for the study.

RESULT AND DISCUSSION

Antibacterial and antifungal activity of successive extract of *Grewia asiatica* Linn. Leaves

A) Antibacterial activity of successive extract of *Grewia asiatica* Linn.

Table 1. Gram +ve antibacterial activity of Successive extract of GA

Microorganism Bacillus Subtilis	**Diameter of Zone of Inhibition in MM* *Grewia asiatica* Linn. extract**			
Conc. (mg/ml)	**Petroleum ether**	**Chloroform**	**Alcohol**	**Water**
20	1.87 ± 0.043	3.54 ±0.033	6.43 ± 0.057	8.22 ± 0.014
40	1.99 ± 0.049	3.89 ± 0.049	6.78 ± 0.057	8.74 ± 0.088
60	2.16 ± 0.084	4.36 ± 0.03	7.17 ± 0.049	9.37 ± 0.043
80	2.63 ± 0.088	4.86 ± 0.049	7.54 ± 0.057	9.86 ± 0.088

*Values are in terms of Mean ± SEM of results done in triplicate

Successive extract of Alcohol and water of *G. asiatica* Linn. leaves exhibited better antibacterial gram +ve activity as compared to their Petroleum ether and chloroform extracts. Organism *Bacillus subtilis* was more susceptible to alcohol and water extract.

Table.2 Gram -ve antibacterial activity of Successive extract of GA

Microorganism P. Aeruginosa	**Diameter of Zone of Inhibition in MM* *Grewia asiatica* Linn. extract**			
Conc.(mg/ml)	**Petr. ether**	**Chloroform**	**Alcohol**	**Water**
20	4.87 ± 0.06	4.64 ± 0.057	7.56 ± 0.12	6.87 ± 0.057
40	5.37 ± 0.088	5.07 ± 0.14	8.16 ± 0.066	7.23 ± 0.033
60	5.91 ± 0.11	5.92 ± 0.033	8.79 ± 0.1	7.68 ± 0.057
80	6.26 ± 0.033	6.17 ± 0.057	9.03 ± 0.15	7.96 ± 0.088

*Values are in terms of Mean ± SEM of results done in triplicate

Successive extract of alcohol and aqueous of *Grewia asiatica* Linn. leaves exhibited better antibacterial gram -ve activity as compared to their Petroleum ether and chloroform extracts. Organism *P. aeruginosa* was more susceptible to alcohol and aqueous extract.

B) Antifungal activity of Successive extract of *Grewia asiatica* Linn. leaves

Table.3 Antifungal activity of Successive extract of GA

Microorganism S. Cerevisae	**Diameter of Zone of Inhibition in MM* *Grewia asiatica* Linn. extract**			
Conc.(mg/ml)	**Petro.ether**	**Chloroform**	**Alcohol**	**Water**
20	2.47 ± 0.066	2.53 ± 0.088	7.33 ± 0.066	5.08 ± 0.057
40	3.08 ± 0.057	3.16 ± 0.066	7.94 ± 0.033	5.73 ± 0.033
60	3.73 ± 0.088	3.75 ± 0.06	8.38 ± 0.057	6.12 ± 0.033
80	4.41 ± 0.06	4.27 ± 0.057	9.03 ± 0/066	6.86 ± 0.066

*Values are in terms of Mean ± SEM of results done in triplicate

Successive extract of alcohol and aqueous of *Grewia asiatica* Linn. Leaves exhibited better antifungal activity as compared to their petroleum ether and chloroform extracts. Organism *S.*

cerevisae was more susceptible to alcohol and aqueous extract.

C) Antibacterial and antifungal activity of Standards

Table.4 Antibacterial and antifungal activity of Standards (Streptomycin, Ampicillin, Fluconazole)

Microorganism	**Diameter of Zone of Inhibition in MM***		
	B.subtilis	***P.aeruginosa***	***S.cerevisae***
Conc.(mg/ml)	**Streptomycin**	**Ampicillin**	**Fluconazole**
0.5	12.56 ± 0.033	12.83 ± 0.033	13.1 ± 0.057
1	13.13 ± 0.066	15.53 ± 0.033	14.56 ± 0.066
1.5	14.1 ± 0.057	16.76 ± 0.033	16.16 ± 0.088

*Values are in terms of Mean ± SEM of results done in triplicate

CONCLUSION

This study evaluated that the alcoholic and aqueous extract of *Grewia asiatica* Linn. Leaves exhibited moderate to significant antibacterial and antifungal activity against all the tested bacterial strains. The chloroform extract exhibited moderate antibacterial and antifungal activity. The petroleum ether extract was devoid of any antibacterial and antifungal activity. While mentioned all the organisms are susceptible to alcoholic as well as aqueous extracts.

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