International Journal of Advance Research in Science and Engineering
Volume No.07, Special Issue No.04, March 2018
www.ijarse.com
IJARSE
ISSN: 2319-8354

Evaluation of antibacterial activity of Abutilon theophrasti medic

Musheerul Hassan[1], Reyaz Ahmad Mir[2], Huma Habib[3*]

[1]*Department of Life sciences, Pacific University, Udaipur, (India)*
[2]*Department of Zoology, Islamia College of Science and Commerce, (India)*
[3*]*Department of Biochemistry, Islamia College of Science and Commerce,(India)*

ABSTRACT

Antibiotic resistance is the one of major challenge in the global world, to overcomethis problemworld has focused on an alternate approach which is use of natural products. In this regard our present study was conducted to evaluate antibacterial activity of crude extracts (Root) ofAbutilon theophrasti(Malvacae) against gram-positive (Staphylococcus aureus MTTC-443,Staphylococcus epiderdimisMTCC-1771) and gram-negative (Bacillus cerus MTCC-3381, Proteus vulgaris MTCC-2412, Klebsiella pneumoniae MTCC-7028, Escherichia coli MTCC-10619) bacterial strains. Simple macerations and disc-diffusion method was employed. Methanol, hexane and distilled water were used as solvents for extraction.Three concentrations (500µg/ml, 250µg/ml, and 100µg/ml) were made for each extract. Nalidilixc acid (30µg/ml) was taken as reference standard. Inhibition was concentration dependent, highest inhibition (19mm) was shown by hexane extracts against Staphylococcus aureus. Methanolic extracts were seen to reveal low activity then hexane extracts, meanwhile no inhibition was shown by aqueous extracts.

***Keywords*:Abutilon, Antibacterial, Gram-positive, Gram-negative,**

I.INTRODUCTION

Plants used in traditional medicines contain a vast array of substances that can be used to treat chronic and infectious diseases. In the middle of 20th century, researchers preferred to use synthetic medicines over natural medicines for curing various diseases. However, due to emergence of various side effects like resistance to drugs, trend to use medicinal plants to cure various diseases is becoming popular (i.e., [1]). Natural products from medicinal plants are known to be chemically balanced effective and least injurious with none or much reduced side effects as compared to synthetic medicines, this interest in medicinal plants has grown enormously from the use of herbal products as natural cosmetics and for self-medication by the general public to the scientific investigations of plants for their biological effects in human beings. Beyond this pharmaceutical approach, there is a wide tendency to utilize herbal product to supplement the diet, mainly with the intention of

improving the quality of life and preventing the diseases of elderly people (i,e., [2]). Medicinal plants have been a primary source of health care throughout the world for thousands of years. Multi-factorial health beneficial activity of these plant extracts has been attributed to multi-potent anti-oxidant, anti-microbial, anti-cancer, ant-ulcerative and anti-diabetic chemical constituents known as secondary metabolites or bioactive principles (alkaloids, steroids, tannins, saponins, ubiquinone, ascorbic acid, phenol compounds etc). The WHO estimates that up to 80% of people still rely mainly on traditional remedies such as herbs for their medicine (i,e., [3]). It has been estimated that in developed countries such as United States, plant drugs constitute as much as 25% of the total drugs while in fast developing countries such as China and India, the contribution is as much as 80%.

Abutilon theophrasti (velvetleaf) has medicinal values, used in folk medicine as an expectorant and emollient (i,e.,[4]). Along this plants is used to treat Arthrosis, Sprains, Dysentery, Otitis media, Deafness, Rheumatic pains, Bruise (i,e.,[5,6]). Phytoconstituents include Gallic acid protocatechic acid, catichin, vanillic acid, caffeic acid, ferulic acid, rutin, qurectin, syriaeusin, (i,e.,[7]). Roots are used in, chest infections and urethritis, furthermore fiber and oil are other products from the plant.

II.MATERIALS AND METHODS

2.1. Collection and Authentication of Plant Material

Abutilon theophrasti (Velvetleaf) was collected from village "Qazigund" of Jammu & Kashmir (India) in late august. Latitude 33.56˚ and longitude 75.20˚. Plant was identified and registered at Herbarium centre for Biodiversity and Taxonomy (HCFBAT), "University of Kashmir" India. Voucher specimen (No.2113-KASH).

2.2. Preparation of extracts

Collected plant material was dried under shade at room temperature for about 15 days. Dried plant material was powdered by mechanical grinder. The powder was then sieved to fine mesh, stored in polythene bags at room temperature fallowed by extraction. Methanol and distilled water and hexane were used as solvents. Extraction was done by maceration process. The extracts were concentrated to dryness using rotary evaporator.

2.3. Micro-organisms

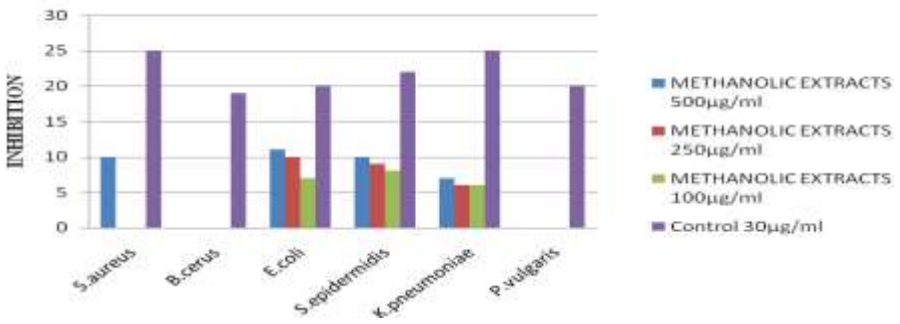
Gram positive (*Staphylococcus aureus* MTTC-443, *Staphylococcus epiderdimis* MTCC-177) and gram-negative (*Bacillus cerus* MTCC-3381, *Proteus vulgaris* MTCC-2412, *Klebsiella pneumoniae* MTCC-7028, *Escherichia coli* MTCC-10619) were kindly provided by University of Rajasthan (India).All the strains were maintained in nutrient agar media slants at 4°C. For inoculums a loopful of the test organism was taken from their respective agar slants and sub-cultured into test tubes containing MH broth. Test tubes were incubated for 24h at 37°C. The obtained bacteria in the broth were standardized using normal saline to obtain a population density of 10^8cfu/ml (i,e.,[8]).

2.4. Determination of antimicrobial activity

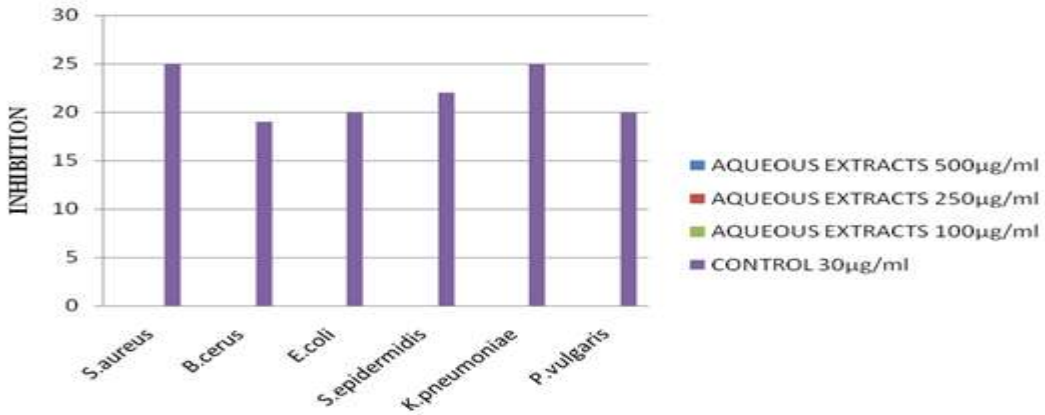
Disk diffusion method was used for evaluation of antimicrobial activity.(i,e.,[9]). Muller Hinton agar (MHA) was chosen as medium, 70% ethanol, autoclave and Ultravoilet radiations were taken to meet sterilizations requirements. One day old fresh culture of bacteria was used for inoculums preparation. A suspension(0.5 McFarland standard) was prepared. Bacterial cultures were swabbed on the surface of sterile agar plates. Dried plant extracts were re-suspended to 500,250,100µg/ml in Dimethyl sulfoxide (DMSO) and sonicated to dissolve. Sterile 5 mm discs were impregnated with 50 µl leaf extracts and placed on the surface of inoculated microbial agar plates. DMSO served as negative control nalidixic acid (30µg/ml/disc) served as positive control. The plates were incubated at 37°C for 24 h. The diameter of the inhibition zones was measured in millimeter. Three replicates were kept in each case and average values were calculated.

III.RESULTS

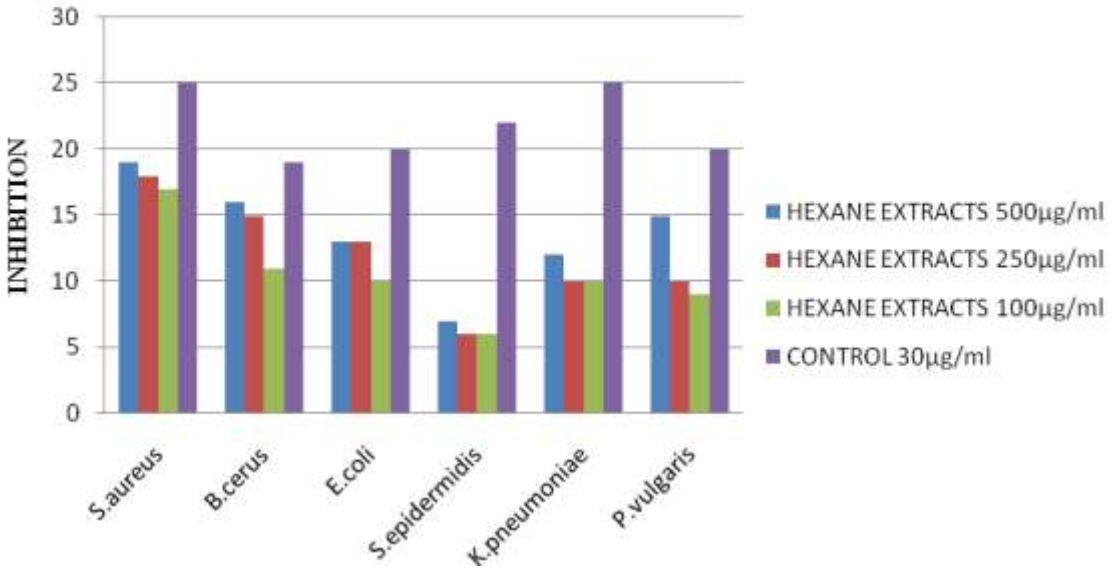
(FIG:1) Antibacterial activity of methanolic extracts of root



(FIG:2) Antibacterial activity of aqueous extracts of root



(FIG:3) Antibacterial activity of hexane extracts of root



Above figs cleared revealed aqueous root extracts displayed zero inhibition at all selected concentrations. Methanolic extracts showed inhibition of 11mm, 10mm, 10mm against *Escherichia coli, Staphylococcus aureus*, *Staphylococcus epidermidis* at 500µg/ml concentration respectively, 250 and 100 µg/ml displayed inhibition zones of 10mm, 7mm, and 9mm, 8mm against same pathogens respectively. 6mm inhibitions were displayed by methanolic extracts against *Klebsiella pneumonia* at 250 µg/ml concentration. Hexane extracts showed significant inhibition against the selected bacterial strains. Maximum inhibition was seen against *Staphylococcus aureus* with the zone of inhibition 19mm,18mm and 17mm on selected concentrations (500, 250 and 100 µg/ml). Inhibition against *Bacillus cerus*, *Escherichia coli*, *Klebsiella pneumonia, Staphylococcus epidermidis* and *Proteus vulgaris* was (16mm, 15mm, 11mm),(13mm,13mm,10mm), (12mm, 10mm, 10mm), (7mm, 6mm, 6mm), (15mm, 10mm, 9mm) respectively. Reference drug nalidixic acid (30µg/ml) showed inhibitions of 25mm, 19mm, 20mm, 22mm, 25mm, and 20mm for selected bacterial strains. On comparing the efficacy of hexane crude extracts with reference drug (nalidixic acid) we find hexane crude extracts has potential to eliminate the infections by selected bacterial pathogens except *Staphylococcus epidermidis*, against which hexane extracts showed inhibition zone of 7mm.

IV.DISCUSSION

On the basis of antibacterial assay in present study hexane extracts were seen to show significant inhibitions then methanolic extracts, while as aqueous extracts were unable to show inhibition activity against selected

bacterial strainsMaximum inhibition was seen against*Staphylococus aureus* (19mm) by hexane extract at 500µg/ml concentration. Methanoic extractswere seen to show maximum inhibition of 10mm against *Staphylococus aureus* and *Staphylococus epidermidis.*All inhibitions were concentration dependent. *Proteus valguris* was not affected by methanolic extracts meanwhile hexane extracts showed inhibition of 15mm, 10mm and 9mm against the same pathogen on selected concentrations respectively.Early phytochemical investigations have revealed the presence of many phytochemicals like tannins flavonoids glycosides, catechins, antocyanidins, sterols, triterpenes, tannins,(i.e.,[10,11]). These polyphenolic chemicals can be attributed for antibacterial activity of *Abutilon theophrasti*.

Tian *et al.*, 2017 observed antibacterial activity of *Abutilon theophrasti* against 24 test strains and they observed effective antibacterial activity against *Staphylococcus aureus* and *Escherichia coli.* Our study is in accordance with Poonkothai. (2006) who conducted the study on antibacterial activity of leaf extracts of *Abutilon indicum* against *Staphylococcus aureus, Klebsiella pneumoniae,Pseudomonas aeruginosa, Escherichia coli,* and *Salmonella typhi and concluded that leaf exhibited the antibacterial property.*

V.CONCLUSION

This study has demonstrated that, *Abutilon theophrasti*(Root) exhibited potential degree of antimicrobial activity against selected bacterial strains (*Staphylococcus aureus*, *Staphylococcus epiderdimis, Bacillus cerus*, *Proteus vulgaris, Klebsiella pneumoniae, Escherichia coli*).This probably explains the use of this plant by indigenous people against number of infections.

VI.ACKNOWLEDGEMENT

The authors are grateful to Department of pharmacy Pacific University, Rajasthan(India)for providing the facilities to complete the work.

REFERENCES

[1.] Awal, M.A., Wan, I., Endan, J. and Haniff, M., 2004. Determination of specific leaf area and leaf area-leaf mass relationship in oil palm plantation. *Asian Journal of Plant Sciences*, *3*(3), pp.264-268.

[2.] Maffei, M. and Buono, G., 2003. A two step synthesis of 2-oxo-2-vinyl 1, 3, 2-dioxaphospholanes and-dioxaphosphorinanes. *Tetrahedron*, *59*(44), pp.8821-8825.

[3.] Tripathi, L. and Tripathi, J.N., 2003. Role of biotechnology in medicinal plants. *Tropical Journal of Pharmaceutical Research*, *2*(2), pp.243-253.

[4.] Kiyamova, S.E., Khidyrova, N.K. and Shakhidoyatov, K.M., 2012. Neutral compounds from leaves of plants of the family Malvaceae. II. Hibiscus tronuma a. *Chemistry of Natural Compounds*, pp.1-2.

[5.] Dinu, M., Uivaroşi, V., Popescu, M.L., Rădulescu, V., Aramă, C.C., Nicolescu, T.O. and Ancuceanu, R.V., 2010. Proximate composition and some physico-chemical properties of Abutilon theophrasti (velvetleaf) seed oil. *Revista de Chimie (Bucuresti)*, *61*, pp.50-54.

[6.] Balah, M.A. and Nassar, M.I., 2011. Allelopathic constituents from Abutilon theophrasti aerial parts to others weeds. *Res J Agric Biol Sci*, *7*, pp.243-250.

[7.] Tian, C., Yang, C., Zhang, D., Han, L., Liu, Y., Guo, W., Fan, R. and Liu, M., 2017. Antibacterial and antioxidant properties of various solvents extracts of Abutilon theophrasti Medic. leaves. *Pakistan journal of pharmaceutical sciences*, *30(3)*,pp.34-38.

[8.] Kim, D.J., Chung, S.G., Lee, S.H. and Choi, J.W., 2012. Relation of microbial biomass to counting units for Pseudomonas aeruginosa. *African Journal of Microbiology Research*, *6(21*), pp.4620-4622.

[9.] Rios, J.L., Recio, M.C. and Villar, A., 1988. Screening methods for natural products with antimicrobial activity: a review of the literature. *Journal of ethnopharmacology*, *23(2-3*), pp.127-149.

[10.] Paszkowski, W.L. and Kremer, R.J., 1988. Biological activity and tentative identification of flavonoid components in velvetleaf (Abutilon theophrasti Medik.) seed coats. *Journal of Chemical Ecology*, *14*(7), pp.1573-1582.

[11.] Matławska, I. and Sikorska, M., 2005. Flavonoids from Abutilon theophrasti flowers. *Acta poloniae pharmaceutica*, *62*(2), pp.135-139.