



Antimicrobial activity of *Nyctanthus arbor tris-tis* (Linn) leaves extract on selective bacteria

G Mahalakshmi¹, C Porchselvi², K Lingakumar^{3*}

¹ Research Scholar, Centre for Research and PG Studies in Botany Ayya Nadar Janaki Ammal College, Sivakasi, Tamil Nadu, India

² Assistant Professor of Plant Science and Plant Biotechnology, Centre for Research and PG Studies in Botany Ayya Nadar Janaki Ammal College, Sivakasi, Tamil Nadu, India

³ Head and Associate Professor of PG Botany, Centre for Research and PG Studies in Botany Ayya Nadar Janaki Ammal College, Sivakasi, Tamil Nadu, India

Abstract

Antibacterial activity of *Nyctanthus arbor tris-tis* (Linn), an important medicinal plant belonging to the family Oleaceae. The antibacterial activity was studied in leaf against three gram negative bacteria (*E.coli*, *Klebsiella pneumonia* and *Pseudomonas aeruginosa*) and three gram positive bacteria (*Staphylococcus aureus*, *Bacillus subtilis* and *Corynebacterium glutaminum*). The maximum activity of the plant extract against gram negative bacteria shows the possibility of developing drug against the diseases produced by gram negative bacteria. Inhibition effect of *E.Coli*, *Bacillus subtilis*, *Staphylococcus aureus*, *Klebsiella pneumonia*, *Corynebacterium glutaminum*, *pseudomonas aeruginosa* has various solvent extract of *Nyctanthus arbor tris-tis*. This suggests that extract from the plant have broad spectrum of activity against tested bacteria. Moreover, these leaves extracts also tested for their antibacterial activity against inhibitory effect on growth of these isolated bacteria. Hence this study also enhances the nutrition value of leaves because *Nyctanthus arbor tris-tis* provide the resistance against some kind of bacteria.

Keywords: *Nyctanthus arbor tris-tis* (Linn), antibacterial activity

Introduction

Microorganisms have significant cause on human health to surroundings and to our economy. Some of them have beneficial effects without which we could not exist but others have harmful effects. Our battle overcome their harmful effects our understanding and ingenuity to the limit. Saprophytic decomposers play an important role in breaking down dead organic matter in ecosystem but on the other hand these microorganisms also responsible for food spoilage and subsequent illness so microorganisms can be beneficial or harmful depending upon what we want from them. (Kroes *et al.*, 1999) ^[1]. New compounds from plants which have some kind of vegetables and fruits lead synthetic antimicrobial compounds which have ability to prevent the resistance of pathogenic bacteria to antibiotics. It is necessary to evaluate the potential of folk medicine on scientific basis if we want to use folk medicine for the treatment of common infectious diseases. (Fabricant and Farnworth, 2001) ^[2]. *Nyctanthus arbor tris-tis* is commonly known as Harshinghar or Night Jasmine. It belongs to the family Oleaceae (Shukla *et al.*, 2011) ^[5]. It has also been reported to possess hepatoprotective, anti-leishmanial, anti-viral, anti-fungal activities and analgesic, antipyretic and ulcerogenic activities. The plant also possess anti-allergic, anti-malarial (Badam *et al.*, 1988) ^[6] anti-helminthic (Lal *et al.*, 1976) ^[7], activities and recently reported hepatoprotective (Kusum *et al.*, 2006), ^[8] anti-spermatogenic and anti-oxidant activities (Rathee *et al.*, 2007) ^[9]. Hence in the present study, an attempt has been made with the

antimicrobial activity of various extracts of *Nyctanthus arbor tris-tis* certain bacteria.

Material and methods

Collection of plant sample

Fresh leaves of *Nyctanthus arbor tris-tis* (Linn) were collected from Sivakasi. The plant material was identified in the herbarium for Research and PG studies in Botany, Ayya Nadar Janaki Ammal College, Sivakasi by referring to the flora of the presidency of the Madras (Gamble, 1920).

Preparation of plant Extract

The leaves were washed with water to remove the adhering dust particles the plant leaves were shade dried at room temperature. The dried leaves were ground into a fine powder. The after 2 gm of each fine powdered sample was weighed and separately soaked in 10 ml of water in the ratio 1:5 weight per volume. These were allowed to stand for 24 hours at ambient temperature. The soaked leaf powder was filtered through cheese cloth and the filtered used as extract. Crude extract of this plant was stored in refrigerator and used antibacterial activity.

Antibacterial Assay

The antibacterial activity of the various extract was evaluated by the filter disc method. This method is based on the diffusion of an antibiotic from a filter paper disc through the solidified culture media of a petridish used for study. Growth

of inoculated microorganism is inhibited entirely in a circular area “Zone around the filter paper disc” organism containing a solution of the plant extract.

Test Microorganism

The following microorganism is used to show the antibacterial activity among them both gram positive and gram negative bacteria such as *E.coli*, *Bacillus subtilis*, *Staphylococcus aureus*, *Klebsiella pneumonia*, *Corynebacterium glutaminum* and *Pseudomonas aeruginosa*. These were tested using broth. One loopful of the respective culture was taken in slants which were maintained below 40° C were taken inoculated and incubated at 37 ° C for 24 hours and were observed for their turbid nature. It was compared with that of serial broth. The presence of turbidity indicated growth and suitability of the culture for further work.

Preparation of inoculum

Stock cultures were maintained at 4°C on slants of nutrient agar. Active cultures for experiments were prepared by transferring a loopful of cells from the stock cultures to test tubes of nutrient agar for bacteria that were incubated without agitation for 24 h at 37°.

Disc preparation

Antibacterial activity of various test extracts was screened by filter paper disc method (Vanden Bergh and Vlietinck, 1991)^[12]. The filter paper was cut down into small disc (6mm diameter) and sterilized at 180°C for 20 minutes in hot air oven impregnated with the test solution. The dried disc was placed on the surface of the medium. The discs were left standing for 1-4 hours, at room temperature as a period of pre-incubation diffusion to minimize the effects of variation in time between the applications of different solutions.

Result and Discussion

Effect of acetone extract of *Nyctanthus arbor tris-tis* against gram negative and positive bacteria

The activity observed that the acetone extract of *Nyctanthus arbor tris-tis* showed significant antibacterial activities against all the tested bacterial. Maximum activity was conferred against *E.coli* (21mm) while minimum was observed against *Bacillus subtilis* with mean inhibition zone diameter 6 mm (Fig.1)

Effect of Chloroform extract of *Nyctanthus arbor tris-tis* against gram negative and positive bacteria

The leaf extract of *Nyctanthus arbor tris-tis* (Linn) in Chloroform solvent tested for the antibacterial activity against *E.coli*, *Bacillus subtilis*, *Staphylococcus aureus*, *Klebsiella pneumonia*, *Corynebacterium glutaminum* and *Pseudomonas aeruginosa*. Maximum activity was conferred against *E.coli* (18 mm) while minimum was observed against *Corynebacterium glutaminum* with mean inhibition zone diameter 8 mm (Fig.1).

Effect of 1% formic acid extracts of *Nyctanthus arbor tris-tis* against gram negative and positive bacteria

The leaf extract of *Nyctanthus arbor tris-tis* (Linn) in 1%

formic acid solvent tested for the antibacterial activity against *E.coli*, *Bacillus subtilis*, *Staphylococcus aureus*, *Klebsiella pneumonia*, *Corynebacterium glutaminum* and *Pseudomonas aeruginosa*. Maximum activity was conferred against *E.coli* (15 mm) while minimum was observed against *Pseudomonas aeruginosa* with mean inhibition zone diameter 5 mm (Fig.1)

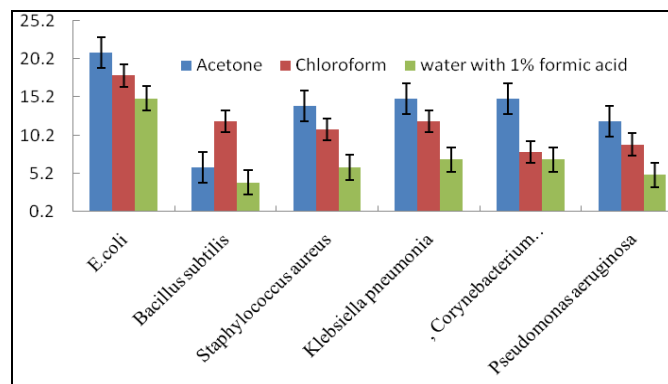


Fig 1: Antimicrobial activity of Acetone, Chloroform and Water with 1% formic acid extract of medicinal plants against bacteria using Disc diffusion method

Discussion

In the present experiment, Antibacterial activity of various solvent leaf extract of *Nyctanthus arbor tris-tis* were studied and reported in fig. (1) against *E.coli*, *Bacillus subtilis*, *Staphylococcus aureus*, *Klebsiella pneumonia*, *Corynebacterium glutaminum* and *Pseudomonas aeruginosa*. All three extract were active, but acetone extract was observed as most active extraction. It showed considerable activity against all bacterial. Samy and Ignachimuthu, 2000 reported that *C. auriculata* exhibited significant activity against *E. coli* and *S. aureus*. The antimicrobial activity of *Nyctanthus arbor tris-tis* extract may be due to the presence of phenolic constituents. Harami *et al.*, (2000)^[11] studied the antimicrobial activity and phytochemical screening of some selected medicinal plants in Bauhi (Nigeria) four plants reputed to have medicinal properties were extracted and screened using the antimicrobial bio-assay. Significant inhibitory activity was noticed against *E.coli*, *Staphylococcus aureus* and *Pseudomonas aeruginosa*. Antibacterial activity of the chloroform, butanol, ethyl acetate and n-hexane extracts of *Medicago* spp. possess good antibacterial activity against *Bacillus subtilis*, *E. coli*, *P. aeruginosa*, *S. typhi* and *S.aureus* was reported by Baloch *et al.*, (2013)^[10]. The antimicrobial activity of the tested extracts and fractions are comparable with the standard drugs. The plants have traditionally provided a source of hope for novel drug compounds, as plant herbal mixtures have made large contributions to human health and wellbeing.

Conclusion

Nyctanthus arbor tris-tis (Linn) various solvent extracts of leaves have great potential against microorganism. Thus, *Nyctanthus* can be used in the treatment of infectious diseases caused by resistant microbes. The result proved that the presence of antibiotic nature present in the *Nyctanthus* leaves

References

1. Kroes I, Lepp PW, Relman DA. Bacterial diversity within the human subgingival crevice. P.N.A. 1999; 96:14547-52.
2. Fabricant DS, Farnsworth NR. The value of plants used in traditional medicine for drug discovery. Environ. Microbiology. 2001; 109:69-75.
3. Samy RP, Ignacimuthu S. Antibacterial activity of some folklore medicinal plants used by tribals in Western Ghats of India. J Ethnopharmacol. 2000; 69:63-71.
4. Farland Nephelometer J. An instrument for estimating the number of bacteria in suspensions used for calculating the opsonic index and for vaccines. J Am Med Assoc. 1907; 14:1176-1178.
5. Shukla AK, Patra S, Dubey VK. Deciphering molecular mechanism underlying antileishmanial activity of *Nyctanthes arbortristis*, an indian medicinal plant. J. Ethanopharmacology. 2011; 134(3):996-8.
6. Badam L, Deolankar RP, Rojatkar SR, Nagsampgi BA, Wagh UV. Invitro antimalarial activity of medicinal plants of India Med. Res. 1988; 87:379-383.
7. Lal J, Chandra SV, Prakash Sabir RM. In vitro anthelmintic action of some indigenous medicinal plants on *Ascaris diagal* I worms. Ind Physiol Pharmacol. 1976; 20:64-68.
8. Kusum H, Sureban RR, Gopalakrishna B, Byahatti VV, Rajendra SV. Hepatoprotective activity of the leaves of *Nyctanthes arbortristis* Linn. Ind. Pharmaceut. Sci. 2006; 68:542-543.
9. Rathee JS, Hassarajani SA, Chattopadhyay S. Antioxidant activity of *Nyctanthes arbor-trisr-tis* leaf extract Food Chem. 2007; 103:1350-1357.
10. Baloch N, Nabi S, Yasser MSA. In vitro Antimicrobial, Insecticidal, Antitumor Activities and Their Phytochemical Estimation of Methanolic Extract and its Fractions of *Medicago lupulina* Leaves. World Appl Sci J. 2013; 23:500-506.
11. Harami M, Adamu Alibilar A, Chelea MN. Antimicrobial and phytochemical studiesmof some selected medicinal plants in Bauchi (Nigeria) Medicinal and aromatic plants. 2000; 24(2):216.
12. Vanden Bergh DA, Vlietinck AJ. in: Dey, P.M., Harborne, J.B. (Eds), Methods in Plant iochemistry: Screening Methods for Antibacterial and Antiviral Agents from Higher Plants. Academic Press, London, 1991, 47-69.