American-Eurasian J. Agric. & Environ. Sci., 7 (2): 176-178, 2010
ISSN 1818-6769

Analysis of Phytochemical Constituents and Antimicrobial Activities of *Cucumis anguri.* L. Against Clinical Pathogens

S. Senthil Kumar and M. Kamaraj

Department of Botany, PG and Research Jamal Mohamed College, Tiruchirappalli, Tamil Nadu, India

Abstract: The aim of the study was to investigate the *Cucumis anguria* phytochemical compounds and antimicrobial activity of different extracts. The phytochemical compound screened by GC-MS method. In the GC-MS analysis, 10 bioactive phytochemical compounds were identified in the ethanolic extract of *Cucumis anguria*. The ethanol-methanol, chloroform and ethyl acetate were used to extract the bioactive compounds from the fruits of *Cucumis anguria* to screen the antibacterial, antifungal activities were done for selected human clinical pathogens by Disc Diffusion method. The maximum antibacterial and antifungal activities were observed in ethanolic extracts when compared other extracts. *Cucumis anguria* fruit extract with ethanol can be used as antimicrobial agents.

Key words: *Cucumis anguria* · Phytochemical analysis · Antibacterial activity

INTRODUCTION

Plants have been important source of medicine for thousands of years. The World Health Organization estimates that up to 80 per cent of people still rely mainly on traditional remedies such as herbs for their medicines. Screening techniques of biologically active medicinal compounds have been conducted on well known species of plants used in medium and most plants have shown antibacterial activity. In *Cucurbitaceae* family members are very useful medicinal plants such as *Momordica dioica* and *Zehneria scabra*. Likewise *Cucumis anguria* is one of the medicinal plants. Plant fruits are used to treat the stomach pain by local people. Hence no reports are available this plant.

MATERIALS AND METHODS

Cucumis anguria belongs to the family Cucurbitaceae. Locally known as *Vizavellari*, plants and its fruits were collected from Manapparai, Tiruchirappalli District, Tamil Nadu and South India. Plants were authenticated Prof. Dr. S. Soosairaj, Taxonomist, Department of Plant Biology and Plant Biotechnology, St. Joseph's College, Tiruchirappalli District.

Preparation of Plant Extract: The fruit of *Cucumis anguria* was air-dried and crushed to small piece and powdered. Twenty grams of powdered plant materials mixed with 100 ml of various solvents. The extracts preparations were done as previously described by Alade and Irobi [1]. The extracts were prepared by using Soxhlet apparatus collected and stored in a vial for further studies. Sofawara [2].

GC-MS Analysis: The GC-MS analysis of the *Cucumis anguria* fruit was performed using Clarus 500 Perkin Elmer gas chromatography equipped with a Elite-5 capillary column and mass delector turbomass gold of the company which was operated in El mode. Helium was the carries gas at a flow rate of 1 ml/mn. The injector was operated at 200°C and the oven temperature was programmed as follows: 60°C for 15 min, then gradually increased to 280°C at 3 min. The identification of components was based on comparison of their mass spectra with those of Wiley and NBS Libranies and those described by Adams [3] and Abiodun *et al.* [4] as well as on comparison of their retention indices with literature. Vanden Doll and Kratz [5].

Disc Preparation: The discs with 6 mm diameter were prepared from Whatman No. 1 filter paper. The discs were sterilized by autoclave at 12°C. After the sterilization the moisture discs were dried on hot air oven at 50°C. The various solvent extracts discs and control discs were prepared.

Correspoding Author: S. Senthil Kumar, Department of Botany, PG and Research Jamal Mohamed College, Tiruchirappalli, Tamil Nadu, India Tel: +99-9865752420

Antibacterial and Antifungal Activity: The antibacterial and antifungal activity studies were carried out by disc diffusion techniques. Bauer *et al.* [6]. The sterile nutrient agar plates and potato dextrose agar plates were prepared. The bacterial test organisms like *Staphylococcus aureus, Bacillus subtilis, Pseudomonas aeruginosa, Salmonella typhi, Escherichia coli* and *Proteus vulgaris* were spread over the nutrient agar plates by using separate sterile cotton buds. Rape and Van staden [7]. Then the fungal test organisms like *Aspergillus niger, Aspergillus flavus, Aspergillus fumigatus, Candida albicans, Fusarium oxysporum* and *Fusarium solani* were spread over the potato dextrose agar plates. After the microbial lawn preparation three different extracts of plant disc were placed on the organism inoculated plates with distance control discs were also prepared. All bacterial plates were incubated at 27°C for 24 hr and fungal plates at 24°C for 72 hr. The diameter of the inhibition zone of inhibition was measured in mm. For each test three replicates were performed.

Statistical Analysis: Data were expressed as Mean±Standard Deviation. The data obtained were subjected to ANOVA test to determine whether there was significant difference between extract used and also between the lengths of incubation.

RESULTS AND DISCUSSION

The present study carried out on the *Cucumis anguria*, fruit revealed the presence of medicinal active constituents. In the GC-MS analysis 10 bioactive phytochemical compounds were identified in the ethanolic extract of *Cucumis anguria*. The identification of phytochemical compounds is based on peak area, molecular weight and molecular formula. *n*-Hexadecanoic acid ($C_{16}H_{32}O_2$) with RT 17.33 has Peakarea 44.72, 9, 12, 15-octadecatrienoic acid (zzz) ($C_{18}H_{30}O_2$) with RT 20.11 respectively. The results are presented in Table 1. Same compounds (Hexadecanoic acid, phytol) are reported in Arun kumar *et al.* [8] and Nawall and Anderson [9].

Antibacterial Activity: Antibacterial activity of *Cucumis anguria* was analyzed against six bacterial strains. The maximum antibacterial activities were observed in ethanol extract. Senthil kumar *et al.* [10] and Satish *et al.* [11]. Among the six bacterial organisms maximum suppression was observed in *Escherichia coli* (4.6±1.4) and *Bacillus subtilis* (4.1±0.07) when compared with *Pseudomonas aeruginosa* (3.8±0.06), *Proteus vulgaris* (3.36±0.09), *Staphylococcus aureus* (2.8±0.13) and *Salmonella typhi* (2.6±0.16). Results are presented in Table 2. Dabai *et al.* [12] and Ferro *et al.* [13] reported that some individual phytocompound like anthroqunines have been proposed to have direct antimicrobial activity.

Table 1: Phyto components identified in the plant in the Plant *Cucumis anguria* fruit

S.No	RT	Name of the Compound	Molecular Formula	MW	Peak Area%
1.	11.58	Undeconoic acid	$C_{11}H_{22}O_2$	186	0.90
2.	12.58	Ethyl à-d-glucopyranoside	$C_8H_{16}O_6$	208	3.55
3.	15.35	Tetradeconoic acid	$C_{14}H_{28}O_2$	228	2.89
4.	17.00	9-Hexadeconoic acid	$C_{16}H_{30}O_2$	254	1.61
5.	17.33	*n*-Hexadeconoic acid	$C_{16}H_{32}O_2$	256	44.72
6.	17.64	Hexadeconoic acid, ethyl ester	$C_{18}H_{36}O_2$	284	3.78
7.	19.68	Phytol	$C_{20}H_{40}O$	296	2.26
8.	20.00	9,12-Octadecadienoic acid (Z,Z)	$C_{18}H_{32}O_2$	280	7.85
9.	20.11	9,12,15-Octadecatrienoic acid (Z,Z,Z)	$C_{18}H_{30}O_2$	278	27.46
10.	20.41	Octadeconoic acid	$C_{18}H_{36}O_2$	284	4.99

Table 2: Antibacterial Activity

	Zone of inhibition in mm Mean±SD (n = 3)			
Microorganisms	Ethanolic Extract	Methanolic Extract	Chloroform Extract	Ethylacetate Extract
Staphylococcus aureus	2.8±0.13	0.7±0.0	1.2 + 0.19	0.7±0.19
Bacillus subtilis	4.1±0.07	0.8±0.15	–	0.9±0.17
Pseudomonas aeruginosa	3.8±0.06	–	2.1±0.08	–
Salmonella typhi	2.6±0.16	–	2.2±0.11	1.2±0.18
Escherichia coli	4.6±1.40	–	–	0.5±0.10
Proteus vulgaris	3.36±0.09	–	–	–

'–' Represents absence of measurable inhibition.

Table 3: Antifungal Activity

	Diameter of inhibition zone in mm Mean±SD			
Microorganisms	Ethanolic Extract	Methanolic Extract	Chloroform Extract	Ethylacetate Extract
Aspergillus niger	3.7±1.5	–	–	–
Aspergillus flavus	3.3±1.0	0.2±0.12	0.3±0.12	–
Aspergillus fumigatus	2.3±0.6	–	–	–
Candida albicans	–	–	–	–
Fusarium oxysporum	–	–	–	1.8±0.16
Fusarium solani	0.2±0.1	–	–	–

'–' Represents absence of measurable inhibition.

Antifungal Activity: Antifungal activity of *Cucumis anguria* was analysed against *Aspergillus niger, Aspergillus flavus, Aspergillus fumigatus, Candida albicans, Fusarium oxysporum* and *Fusarium solani.*

The maximum antifungal activity were observed in ethanolic extract disc then the others. Among the six fungal organisms, the maximum growth suppression was observed in *Aspergillus niger* 3.7±1.5, *Aspergillus flavus* 3.3±1.0, then *Aspergillus fumigatus* 2.3 0.6. *Fusarium solani* (0.2±0.,13) having low activity *Candida albicans* and *Fusarium oxysporum* having no measurable inhibition zone. Results are presented in Table3. *Cucumis anguria* extracts have been shown to inhibit the growth both bacteria and fungi. Previously many studies are reported that Ferro *et al.* [13] have focused antimicrobial activity of Aloe vera. Other reports are attempted to determine the antimicrobial activity of purified compounds such as anthroqunines and saponine [12].

CONCLUSION

This study has revealed the presence of phytochemical constituents in the fruits of *Cucumis anguria*. The results lend credence to the folkloric use of this plant in treating microbial infection and shows that *Cucumis anguria* could be exploited for new potent antimicrobial agents.

ACKNOWLEDGEMENT

The authors are thankful to the management of Jamal Mohamed college (Autonomous), Tiruchirappalli 620 020, Tamil Nadu for offering facilities to carryout this study.

REFERENCES

1. Alade, P.I. and O.N. Irobi, 1993. Antimicrobial activities of crude and extracts of Acalypha wilkensiana. J. Ethnopharmacol., 39: 171-174.
2. Sofowara, A., 1993. Medicinal plants and Traditional medicine in Africa. Spectrum Books Ltd., Ibadan, Nigeria. pp: 289.
3. Adams, R., 1995. Identification of essential oil components by Gas Chromatography / Mass Spectroscopy. Allured Publishing Co., Carol Strea, IL.
4. Abiodun Falodun, R. Siraj, and Muhammad Iqbal Choudhary, 2009. GC-MS Analysis of Insecticidal Leaf essential oil of *Pyrenacantha staudtii* Hutch and Dalz (Icacinaceae). Tropical J. Pharmaceutical Res., 8: 139-143.
5. Vanden Dool, H. and P.D. Kratz, 1963. A generalization of the retention index system including linear temperature programmed gas-liquid partition chromatography. J. Chromatography, 11: 463-471.
6. Bauer, R.W., M.D.K. Kirby, J.C. Sherris and M. Turck, 1966. Antibiotic susceptibility testing by standard single disc diffusion method. American J. Clinical Pathol., 45: 493-496.
7. Rabe, T. and J. Van Staden, 1997. Antibacterial activity of South African plants used for medicinal purposes. J. Ethnopharmacol., 56: 81-87.
8. Arunkumar, S. and M. Muthuselvan, 2009. Analysis of phytochemical constituents and antimicrobial activities of *Aloe vera* L. against clinical pathogens. World J. Agricultural Sci., 5: 572-576.
9. Newall, C.A., L.A. Anderson and J.D. Phillipson, 1996. Herbal medicines. The Pharmaceutical Press, London, pp: 25.
10. Senthilkumar, S., S.S. Sathish and M. Kamaraj, 2009. Antibacterial activity of *Rauwolfia serpentina*. J. Microbial World, 11: 244-247.
11. Satish, S., K.A. Raveesha and G.R. Janardhana, 2002. Antibacterial activity of plant extracts on phytopathogenic *Xanthomonas campestris* pathovars. Letters in Applied Microbiol., 28: 145-147.
12. Dabai, Y.U., S. Muhammad and B.S. Aliyu, 2007. Antibacterial activity of anthraquinone fraction of Vitex Doniana. Pakistan J. Ethnopharmacol., 68: 3-37.
13. Ferro, V.A., F. Bradbury, P. Cameron, E. Shakir, S.R. Rahman and W.H. Stimson, 2003. *In vitro* susceptibilities of *Shigella flexneri* and *Streptococcus phygenes* to inner gel of *Aloe barbadensis* Miller. Antimicrobial Agent and Chemotheraphy, pp: 1137-1139.