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Antimicrobial Activities Of Cucumber (*Cucumis Sativas*) Extract On Microorganisms

Balogun, Olubunmi D.

Department of SLT, Federal Polytechnic Offa, Kwara State

Owa, Stephen O.

Irokanulo, Emenike O.

Department of Microbiology, Landmark University, Omu-aran, Kwara State

Abstract: ***The antimicrobial activities of cucumber extract on microorganisms were evaluated. Extract was prepared at 200 mg/ml using aqueous and ethanolic extract as the solvent against some selected clinical bacteria strains. The result of the analysis shows an antimicrobial reaction of the extract against E. coli and Pseudomonas aureginosa while the aqueous extract does not show any reaction. The result of the minimum inhibitory concentration of the cucumber extracts prepared at various concentrations was evaluated. The ethanolic extract shows a broad spectrum antimicrobial property against E. coli and Pseudomonas aureginosa. This emphasizes the need to explore plant based pharmaceuticals as a potent means of treating infections***

Keywords: Antimicrobial, Cucumber, E. coli, Pseudomonas aureginosa.

I. INTRODUCTION

Cucumber (*Cucumis sativas*) is a widely cultivated plant which is eaten in the unripe form. Its fruit extract has shown analgesic activities in mice and anti-acid property (Sharma *et al.,* 2021). Studies have shown the antioxidant and anti-ulcer effect of *Cucumis sativus* on rats. Abiodun and Adeleke, (2020) reported that the seeds of the plant served as good source of protein, fat, minerals and calcium.

Cucumber, *Cucumis sativus*, is an annual plant of the family Cucurbitaceae grown for its edible cucumber fruit. It is widely cultivated in India, particularly in the southern states. Many varieties of the plant are traded in the global market. In South India especially in Tamilnadu *Cucumis sativus* species is widely cultivated and is known for its economical and medicinal values (Swapnil *et al.,* 2021).

The fruits contain Vitamin B1 and C, ascorbic acid, proteolytic enzyme, oxidase, succinic, maleic dehydrogenises and so on. Several investigations revealed antidiabetic, antiulcer, moisturizing, antioxidant and analgesic property of the fruit extracts. The seed extracts were found effective on controlling body weight in diabetic rats and against tapeworms (Joysree *et al.,* 2020). Cytotoxic, antifungal and antibacterial activities have been reported from leaves and stems extracts. Now a days, natural sources has been extensively investigated either for isolating pure compounds to develop new therapeutic agents or screening of antioxidant and antibacterial extracts. These investigations could be used to tackle physiological disorder, pathogenic infections or to develop functional food. The real importance of the plants is reflected by their antioxidant and antibacterial potential (Wang *et al.,* 2021).

Cucumbers are good sources of phytonutrients (plant chemicals that have protective or disease preventive properties) such flavonoids, lignans and triterpenes, which have antioxidant, anti-inflammatory and anti-cancer benefits, according to World's Healthiest Foods (Byers *et al.,* 2019). They contain fiber and beta-carotene. "Beta carotene is an antioxidant that helps with immunity of the skin, eye and the prevention of cancer.

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II. MATERIALS AND METHODS

COLLECTION AND IDENTIFICATION OF PLANT MATERIALS

The cucumber used for this research work was collected from Owode market Offa, Kwara State and it was duly authenticated by an ethno botanist of department of Science Laboratory Technology, Federal Polytechnic Offa, Kwara state. They were then collected in a sterile polythene bag, rinsed, air dried and made into a powdery form before use.

PREPARATION OF PLANT MATERIALS

The cucumber was separately extracted with ethanol and water. 100grams of the finely ground cucumber powder was suspended into 300ml of distilled water and 95% ethanol. The ethanolic extraction was soaked for 24 hours, the extract were then decanted and filtered through a Whatman filter paper, the filterate was then sterilized using a membrane filter and evaporated to dryness at 450^0C, the extract solution were then stored in the refrigerator at 4^0C until used.

STANDARDIZATION OF INNOCULUM

0.1mL of 1% barium chloride was added to 9.9mL of 1% sulphuric acid to give 1ml of Mcfarland standard. It was then reconstituted into another 10ml of sterile distilled water to make 0.5ml of Mcfarland standard. The broth culture of the test organisms was then compared in terms of turbidity to 0.5ml Mcfarland. A loopful of the standard culture was used for antimicrobial activity.

TEST ORGANISMS

The test organisms used for the antimicrobial assay were Pseudomonas aureginosa (clinical strain), Streptococcus pyrogen (clinical strain), Escherichia coli (clinical strain) and staphylococcus aureus (clinical strain). The test organisms mentioned above were collected from the University of Ilorin teaching hospital, Ilorin Kwara State, Nigeria.

SCREENING OF EXTRACT OF ANTI-BACTERIA ACTIVITY (USING WELL METHOD)

In screening out cucumber extract for anti-bacteria activity agar, well diffusion method was employed A sterile cork borer was used to make 2 well of 6mm diameter on the solidified agar, a drop of (0.1ml) each of the extract of both aqueous and ethanolic was introduced into the well and was labeled respectively.

DETERMINATION OF MINIMUM INHIBITORY CONCENTRATION

The estimation of MIC of the cucumber extract was carried out by using the method of Akinpelu and Kolawole, (2007). 0.8, 0.6, 0.4, 0.2 mg/ml concentration of the extract was prepared and introduced into each test tube containing 9ml of the nutrient broth. 1ml of the standardize organism was introduced into test tube containing agar brott. All the test tubes were incubated for 24 hours at 37^0C, the least concentration of the extract that did not permit any visible growth in broth was taken as the minimum inhibitory concentration (MIC). The minimum inhibitory concentration of the extract was carried out for each organism.

DETERMINATION OF MINIMUM BACTERICIDAL CONCENTRATION (MBC)

The minimum bactericidal concentration (MBC) of the plant extracts was determined by the method of Spencer and Spencer, (2004). 1ml of broth were taken from the tube with no visible growth in the minimum inhibitory concentration (MIC) assay and was sub-cultured on a freshly prepared nutrient agar and later incubated at 37^0C for 48hours. The minimum bactericidal concentration (MBC) was taken as the concentration of the extract that did not show any growth on a new set of agar plate.

III. RESULTS

Test Organisms	Ethanolic extract		Aqueous extract		Control (Chloramphenicol)	
	Activities	Zone of Inhibition	Activities	Zone of Inhibition	Activities	Zone of Inhibition
Staphylococcus aureus	-	-	-	-	+	18mm
Streptococcus pyogene	-	-	-	-	+	14mm
E. coli	+	8mm	-	-	+	14mm
Pseudomonas aureginosa	+	9mm	-	-	+	19mm

Table 1: Result of antibacterial activities of ethanolic and aqueous extract of Cucumber prepared at 200mg/ml against some selected clinical strain bacteria

Ethanolic Extract					
Test organisms	**200mg/ml**	**160mg/ml**	**120mg/ml**	**80mg/l**	**40mg/l**
E. coli	+	+*	-	-	-
Pseudomonas aureginosa	+	+	+*	-	-

Key:
+ means activities
- means no activities
** means minimum inhibitory concentration*
Mg/ml means milligram per mil

Table 2: Result of Minimum Inhibitory Concentration of Ethanolic extract of Cucumber prepared at various concentration

Ethanolic Extract					
Test organisms	**200mg/ml**	**160mg/ml**	**120mg/ml**	**80mg/l**	**40mg/l**
E. coli	Bacteriostatic	Bacteriostatic	-	-	-
Pseudomonas aureginosa	Bacteriostatic	Bacteriostatic	Bacteriostatic	-	-

Table 3: Result of Minimum Bactericidal Concentration of Ethanolic extract of Cucumber prepared at various concentration

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IV. DISCUSSION

The result of antibacterial activities of cucumber extract prepared at 200mg/ml against some selected clinical strain bacteria were recorded in the tables above. The analysis reveals that antimicrobial activities were found in ethanolic extracts of cucumber which inhibited the growth of *S. aureus*, *A. hydrophilla*, *S. typhi* and *E. coli*. Also presence of antibacterial compounds were observed in aqueous extracts of cucumber *I. badionotus*, inhibiting a wide range of pathogenic bacteria. This is in conformity with the work of Ridzwan *et al.*, (2018) who found that aqueous extracts of *H. atra* and *B. argus* has inhibitory effect on the growth of the bacteria *E. coli*, *S. faecalis*, *S. sonnei*, *P. mirabilis* and *S. aureus*. Also examined on the respiratory tract of rats cucumbers presents an antibacterial property which inhibited the growth of certain microorganisms. Therefore, these antibacterial factors could play an important role as a first line of defense to pathogens.

V. CONCLUSIONS

Cucumis sativus shows high antibacterial and antifungal activity against microorganisms like *S.pyogene*, *E.coli*, and *P. aureginosa*. Also it justifies the reason why *Cucumis sativus* is used in the traditional system of medicine to treat various infectious disease caused by microbes. Therefore cucumber can be used as an alternative for antibiotics.

REFERENCES

[1] Abiodun, O.A., and Adeleke, R.O. (2020). Comparative Studies on Nutritional Composition of Four Melon Seeds Varieties. Pakistan Journal of Nutrition, 9, 905-908.
[2] Byers, R.E., Baker, L.R., Sell, H.M, Herner, R.C. and Dilley, D.R. (2019). Female flower induction on androecious cucumber, Cucumis sativus L. Journal of American Society of Horticultural Science, 98: 197–199.
[3] Haug, G., Chung, S.M. and Staub, J.E. (2021). Comparative analysis of response to phenotypic and marker-assisted selection for multiple lateral branching in cucumber (Cucumis sativus L.). Theoretical and Applied Genetics, 107: 875–883.
[4] Joysree, D., Anusua, C., Subrata, K.B., Utpal, K.K., Syeda, R.S., and Sheikh, Z.R. (2020). Cytotoxicity and Antifungal Activities of Ethanolic and Chloroform Extracts of Cucumis sativus Linn (Cucurbitaceae) Leaves and Stems. Research Journal of Phytochemistry. 6, 25-630.
[5] Moody, J.H.Jr. (2016). Biosystematic monograph of the genus Cucumis (Cucurbitaceae). Parkway Publishers, Boone, North Carolina, USA.
[6] Mueller, M. Hobiger, S. and Jungbauer, A. (2019). Anti-inflammatory activity of extracts from fruits, herbs and spices, Food Chemistry, 122, Pp. 987.
[7] Ridzwan, R.W. and Decker-Walters, D. (2018). Cucurbits. CAB International, Wallingford, England, p. 226.
[8] Sharma, S., Dwivedi, J., and Paliwal, S. (2021). Evaluation of antacid and carminative properties of Cucumis sativus under simulated conditions. Scholars Research Library, Der Pharmacia Lettre: Vol.4(1), 234-239.
[9] Swapnil, S., Jaya, D., Meenakshi, A. and Sarvesh, P. (2021). Cytoprotection mediated antiulcer effect of aqueous fruit pulp extract of Cucumis sativus. Asian Pacific Journal of Tropical Disease., 61-67.
[10] Wang, S. Melnyk, J. P. Tsao, R. and Marcone, M. F. (2021). How natural dietary antioxidants in fruits, vegetables and legumes promote vascular health, Food Research International, 44, Pp. 14.