

**ANALYSIS OF ANTIBACTERIAL ACTIVITY OF DIFFERENT CONCENTRATIONS  
OF LEAF EXTRACT OF *Gynandropsis Gynandra* ON *Escherichia coli* BACTERIA.**

BY

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**DECLARATION**

I Chelimo Jabeth, Reg. No. BU/UP/2018/4106, hereby declare that this research project report, the **ANALYSIS OF ANTIBACTERIAL ACTIVITY OF DIFFERENT CONCENTRATIONS OF LEAF EXTRACT OF Gynandropsis gynandra ON Escherichia coli BACTERIA**. Is my original work, which has never been submitted or published before to any board of examiners for award of degree in Bachelor of Science and education or any other kind of qualification.

Signature ..... Date.....

CHELIMO JABETH

This research project Report has been submitted with approval of the supervisor.

Signature..... Date.....

Madam Natukunda Flavia

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**KEY TERMS**

Antibacterial, Extracts, *Gynantropsis gynandra*, inhibition.

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## **Abstract**

Medicinal plants have been sources of a number of important compounds which have been discovered during last century. Eighty percent of the world population still depends on herbal medicine as their main source of medicinal therapy. Until the 1950's the organism was more or less regarded as a normal non-pathogenic cohabitant of the enteric tract of warm-blooded animals and humans. However, during the last four-five decades, a tremendous amount of research has established *E. coli* among the important etiological agents of enteritis and several extra intestinal diseases such as urogenital infections, wound infections, mastitis, septicemia and meningitis. The main objective of this research therefore is; to elucidate scientifically the effect of the leaf extract of *Gynandropsis gynandra* on the *E. coli*. In vitro experiment was performed with the test organism *E. coli* where the organism was cultured on selective EMB Agar, refrigerated in the Agar slants of TSA and then inoculated on the Petri dishes containing TSA and then disc diffusion method was used to determine the level of antibacterial inhibition to the nearest mm. For the three samples of the plant from different gardens, the minimum average level of inhibition was 7.8mm for 50mg/ml, 12.4mm for 200mg/ml. A maximum average level of inhibition of 12.8mm for concentration 200mg/ml. The control experiment was constant at 16mm. The small difference in the level of antibacterial inhibition was ascribed to the tender leaves of the first sample research also showed that 200mg/ml is not the optimum concentration for inhibition of *E. coli*. In the research the controlled experiment exhibited the highest level of inhibition of *e coli*, this shows that the concentration of the extract was still less toxic to the bacteria and hence a basis that *e coli* can still be further studied in vivo experiments to discover the potentialities of the plant extract in antimicrobial activity

## CHAPTER ONE

### 1.0 INTRODUCTION

#### 1.1 Background

##### **Gynandropsis gynandra**

Medicinal plants have been sources of a number of important compounds which have been discovered during last century. In the light of their established therapeutic efficacy, the pharmaceutical industries are using crude extracts of medicinal plants for manufacturing drugs (Meskin MS, 2002). The synthesis of drugs on the basis of the chemical structures of the natural products. Modern pharmaceutical industries still rely to some extent on the bioactive principle, obtained from plants (Klayman DL et al.,1984),. Eighty percent of the world population still depends on herbal medicine as their main source of medicinal therapy (Unnikrishnan P 2010). Today many scientists and medical experts around the world are emphasizing the value of herbal remedies for health. Only a small fraction of earth's plants have been investigated scientifically leaving an enormous unexplored potential. From the foregoing, it is apparent that more organized efforts are required for bioassay directed isolation studies of natural products from medicinal plants ( Adoga GI et al., 2014),. The presence of phytochemical constituents in medicinal plants made them useful for healing as well as for curing of human diseases ( Nostro A, et al., 2000),. Phytochemicals are naturally occurring compounds in the medicinal plants (Abdul Wadood GM et al. 2013). Large populations of the world, especially in developing countries depend on the traditional system of medicine to treat variety of diseases ( McGaw LJ, Jager AK and Staden JV,2000),. Several hundred genera of plants were utilized traditionally for medicinal purposes. The world health organization (World Health Organization (WHO) (2002),. reported that 80% of the world population relies chiefly on traditional medicine and a major part of the traditional therapies which involve the use of plant extract and their constituents (Ahmed I and Beg AZ (2003),.



## References

- Abdul Wadood GM, Babar Jamal SB, Naeem M, Khan A, Ghaffar R and Asnad (2013) Phytochemical Analysis of Medicinal Plants Occurring in Local Area of Mardan. *Biochemistry & Analytical Biochemistry*
- Ahmed I and Beg AZ (2003) Antibacterial and phytochemical studies on 45 Indian Medicinal plants against multi-drug resistance human pathogens. *Journal of Ethnopharmacol* 74:113-123.
- Ajaiyeoba Segelman AB, Farnsworth NR and Quimby MW (1969) Biological and phytochemical evaluation of plants, 3 False negative saponin test results induced by the presence of tannins. *Lloydia*; 32(1):52.
- Ajaiyeoba EO (2000) Phytochemical and antimicrobial studies of *Gynandropsis gynandra* and *Buchholziaceae*. *African Journal of Biomedical Research* 3, 161-165.
- Ali M, Yahaya A, Zage AU et al. (2017) In-vitro Antibacterial Activity and Phytochemical Screening of *Psidium guajava* on Some Enteric Bacterial Isolates of Public Health Importance. (2017) *J Advances in Med Pharmaceutical Sci* 12(3): 1-7.
- Borgio JF, Thorat PK and Lonkar AD (2008) Toxicity of *Gynandropsis pentaphylla* extracts against Microbial and its Phytochemical Profile. *Ethno-botanical Leaflets* 12, 320-336.
- Chang SS, Ostric-Matis JB, Hsieh OA and Hung CL (1977) Natural antioxidants from rosemary and sage. *J. Food Sci.* 42: 1102-1106.
- Cheesbrough M (2006) *District laboratory practice in tropical countries*, second edition, part two, Cambridge University Press, London
- Cheng HY, Lin CC, Lin TC (2002) Anti-herpes simplex virus type 2 activity of casuarinin from the bark of *Terminalia arjuna* Linn. *Antiviral Research* 55:447-455.
- Chidozie VN, Adoga GI, Chukwu OC, Chukwu ID and Adekeye AM (2014) Antibacterial and Toxicological Effects of the Aqueous Extract of *Mangifera Indica* Stem Bark on Albino Rats

- E. Cicchetti, A. Chaintreau, Comparison of extraction techniques and modeling of accelerated solvent extraction for the authentication of natural vanilla flavors, *J. Sep. Sci.* 32 (2009) 3043–3052.
- Erdman JW (2007) Flavonoid and Heart Health (2005) Proceedings of the ILSI North America Flavonoid workshop. May 31 – June 1. *J Nutrition* 137(3):718s-737s.
- Gupta AS and Chakravarty MM (1957) Studies on the seed for composition of desert plants. The component fatty acids of *Gynandropsis pentaphylla* seed fat. *Science and Culture* 23, 306-307.
- Klayman DL, Lin AJ and Acton N (1984) Isolation of Artemisinin (Qinghaosu) from *Artemisia* annual Growing in the United States. *Journal of Natural Products* 47 (4 pp715-717
- Kujumgiev A, Tseveikoval TS, Serkedjivay DE, Bankora V, Christo R, et al. (1999), antifungal and antiviral activity of propolis geographic origin. *J Ethnopharmacol.* 44:35-40. Antibacterial
- McGaw LJ, Jager AK and Staden JV (2000) Antibacterial, anti-helminthes and anti-amoebic activity in South Africa medicinal plants *J. Ethno* 72 : 247 – 263
- Meskin MS (2002) *Phytochemicals in Nutrition and Health.* CRC Press p.123
- Nostro A, Germano MP, D'angelo V, Mariano A and Lanattel MA (2000) Extraction method and bioautography for evaluation of medicinal plants antimicrobial activity. *Letter in Applied Microbiology* 30: 379.
- Osama A and Awdelkarim S (2015) Phytochemical Screening of *Fiscussycomorus* L. Bark and *Cleome gynandra* L. aerial parts. *Journal of Pharmacognosy and Photochemistry* 4(4): 24 - 27
- Riley LW, Remis RS, Helgerson SD, McGee HB, Wells JG, Davis BR, et al. Hemorrhagic colitis associated with a rare *Escherichia coli* serotype. *N Engl J Med.* 1983;308:681–5.

- Banatvala N, Griffin PM, Greene KD, Barrett TJ, Bibb WF, Green JH, et al. The United States National Prospective Hemolytic Uremic Syndrome Study: microbiologic, serologic, clinical, and epidemiologic findings. *J Infect Dis.* 2001;183:1063–70.
- Bell BP, Goldoft M, Griffin PM, Davis MA, Gordon DC, Tarr PI, et al. A multistate outbreak of *Escherichia coli* O157:H7-associated bloody diarrhea and hemolytic uremic syndrome from hamburgers. The Washington experience. *JAMA.* 1994; 272:1349–53.
- Boyce TG, Pemberton AG, Wells JG, Griffin PM. Screening for *Escherichia coli* O157:H7—a nationwide survey of clinical laboratories. *J ClinMicrobiol.* 1995; 33:3275–7.
- Mead PS, Slutsker L, Dietz V, McCaig LF, Breese JS, Shapiro C, et al. Food-related illness and death in the United States. [See comments]. *Emerge Infect Dis.* 1999; 5:607–25.
- Neill MA, Tarr PI, Clausen CR, and Christie DL, Hickman RO. *Escherichia coli* O157:H7 as the predominant pathogen associated with the hemolytic uremic syndrome: a prospective study in the Pacific Northwest. *Pediatrics.* 1987; 80:37–40.
- Roa RR, Babu RM, Rao MRV (1995) Saponins as anticarcinogens. *The Journal of Nutrition.* 125:717-724. [23] Okwu DE (2001) Evaluation of the chemical composition of indigenous spices and flavoring agents. *Global Journal of Pure and Applied Sciences* 7(3):455-459.
- S.W. Lyu, U. Blum, T.M. Gerig, T.E. O'Brien, Effects of mixtures of phenolic acids on phosphorus uptake by cucumber seedlings, *J. Chem. Ecol.* 16 (1990)2559–2567.
- Siegler RL, Pavia AT, Christofferson RD, Milligan MK. A 20-year population-based study of postdiarrheal hemolytic uremic syndrome in Utah. *Pediatrics.* 1994; 94:35–40.
- Singleton P (1999). *Bacteria in Biology, Biotechnology and Medicine* (5th Ed.). Wiley. pp. 444–54. ISBN 978-0-471-98880-9.
- Sofowora A (1993) *Medicinal Plants and Traditional Medicine in Africa*; John Wiley and Sons, Ltd, Ife, Nigeria p. 55-201.

- Tenaillon O, Skurnik D, Picard B, Denamur E (March 2010). "The population genetics of commensal *Escherichia coli*". *Nature Reviews. Microbiology*. 8 (3): 207–17. Doi: 10.1038/nrmicro2298. PMID 20157339. S2CID 5490303.
- Thenmozhi S, Subhashi U, Kameshwaran S, Danalakshmi M and Rajamanickam GV (2013) Morpho-anatomical and Preliminary Phytochemical Studies of Leaves of *Gynandropsis pentaphylla* L. *Int. J. of Pharm. & Life Sci.* 4(7): 2800 - 2809
- Ugwu OPC, Nwodo OFC, Joshua PE, Bawa A, Ossai EC, et al. (2013) Phytochemical and Acute Toxicity Studies of *Moringaoleifera* Ethanol Leaf Extract. *International Journal of Life Sciences, Biotechnology and Pharma Research* 2(2):66-71.
- Unnikrishnan P (2010) Role of Traditional Medicine in Primary Healthcare. *Yokohama Journal of Social Sciences* Vol. 14 No 6 p.723-742
- Usunobun U, and Okolie PN (2016) Phytochemicals analysis and proximate composition of *Vernonia amygdalina*. *International Journal of Scientific World* 4(1):11-14.
- Wells, J. C. (2000) *Longman Pronunciation Dictionary*. Harlow [England], Pearson Education Ltd.
- World Health Organization (WHO) (2002) Use of antibacterials outside human medicine and result and antibacterial resistance in humans. World Health Organization Achieved from the Original on 13 May, 2004.
- Guarner, F. and Malagelada, J R. (2003). Gut fora in health and disease. *Lancet*. 360, 512-519.
- Falk, P.G., Hooper, L.V., Midtvedt, T., and Gordon, J.I. (1998). Creating and maintaining the gastrointestinal ecosystem, what we know and need to know from gnotobiology. *Microbial. Mol. Biol. Rev.* 62, 1157-1170.