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Laboratory Evaluation of Antibacterial Activity of *Gomphocarpus purpurascens* A. Rich Leaves and Stems Extracts against *Escherichia coli*

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Abstract: This is the first report of laboratory evaluation of antibacterial activity of *Gomphocarpus purpurascens* A. Rich leaves and stems extracts against *Escherichia coli* in Gondar University, Ethiopia. In Ethiopia, high curative evidence was noticed in wound management and wart treatment, where people using 'tifirgina (Local name)'as a medicament. The extract was filtered by using Whatman filter paper (540 hardened ashless circles, 110mm thickness CAT No. 1540 110). The solvents from the crude extracts were removed by using a rotary vacuum evaporator with the water bath temperature of 50°C. The main aim was to detect whether the extraction of *Gomphocarpus purpurascens* A. Rich leaves and stems acted on *Escherichia coli* or not.

Key words: Antibacterial Activity · *Gomphocarpus purpurascens* · *Escherichia coli*

INTRODUCTION

Escherichia coli are a facultative anaerobe, gram negative and belong to the family *Enterobacteriaceae* and are usually a commensal organism [1]. *Escherichia coli* (*E. coli*) are up to 3 ìm in length, ferment glucose and wide range of sugars. These lactase fermenters produce pink colonies on McConkey agar. Hemolytic activity on blood agar is characteristics of certain strain of *E. coli*. It's motile with peritrichous flagella and often fimbriate [2, 3]. The O157: H7 is the major serotype that was recognized as a cause of human illness. *E. coli* O 157:H7 is one of the more than 60 serotypes of verotoxin producing *E. coli* that cause that a variety of human illness such as mild diarrhea, hemorrhagic colitis and hemolytic-uremic syndrome (HUS) [4].

Escherichia coli are a common inhabitant of the gastrointestinal tract of humans and animals. Usually, *E. coli* forms a beneficial symbiotic relationship with its host and plays important roles in promoting the stability of the luminal microbial flora and in maintaining normal intestinal homeostasis [5]. As a commensal, *E. coli* rather remains harmlessly confined to the intestinal lumen and rarely causes a disease. However, in the debilitated or immune-suppressed host, or when the gastrointestinal barriers are violated, even nonpathogenic-commensal strains of *E. coli* can cause infection [6].

The pathogenic *E. coli* strains are broadly classified as either enteric/diarrheagenic *E. coli* or extra intestinal *E. coli* (ExPEC). Six different *E. coli* "Pathotypes," including enteropathogenic *E. coli* (EPEC), enterohemorrhagic *E. coil* (EHEC), enterotoxigenic *E. coli* (ETEC), enteroaggregative *E. coli* (EAEC), enteroinvasive *E. coli* (EIEC)and diffusely adherent *E. coli* (DAEC), are the enteric/diarrheagenic *E. coli* and two pathotypes, neonatal meningitis *E. coli* (NMEC) and uropathogenic *E. coli* (UPEC), are the most common ExPEC [6, 7]. Several pathotypes of enteric/diarrheagenic *E. coli* give rise to gastroenteritis but rarely cause disease outside of the intestinal tract. On the other hand, the ExPEC strains maintain the ability to exist in the gut without consequence but have the capacity to disseminate and colonize other host niches including the blood, the central nervous system and the urinary tract, resulting in disease [8].

The Aim of Study: The main aim of the study was to conduct whether the Gomphocarpus purpurascens has antibacterial activity or not.

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MATERIALS AND METHODS

Plant Selections and Identification: In this study, a plant with known toxicity properties was selected from secondary data i.e. some bio-ethnological knowledge by the farmers and local residents. Plant species of *Gomphocarpus purpurascens* A.Rich (Family *Asclepiadaceae*– Milkweed family) showing toxicity properties was chosen. Since the peoples have used this plant as a medicament agent for numerous ailments like wound treatment as well as for wart treatment. In Ethiopia, high curative evidence was noticed in wound management and wart treatment, where people using 'tifirgina (Local name)'as a medicament. The fresh leaves and stems of tifirgina were collected from the outskirts of Gondar town, Amhara Region, Ethiopia and brought to Environmental Biology laboratories of Gondar University. The collected voucher specimen has been identified, pressed, numbered, dried and deposited in the Gondar University Regional Herbarium, Ethiopia.

Media which used in microbiological analysis were obtained from microbiology laboratory of Gondar University. But, Vancomycin which used in control group was obtained from Biology laboratory of Gondar University.

Preparation of Acetone and Methanolic Extracts from the Dried Leaves and Stems of Tifirgina: Tifirgina leaves and stems were shade dried at room temperature for 30 days and the dried leaves and stems were powdered by using electrical blender. The 300g tifirgina powder was kept in two conical flasks with 1000ml capacity and 600ml of acetone and methanol (Solvent) were poured into each flask. Flasks were covered with aluminum foil and placed in a water bath for 72 h for continuous agitation for thorough mixing and complete elucidation of bio-active compounds to dissolve into the solvent. Then the extracts were filtered by using Whatman filter paper (540 hardened ashless circles, 110mm thickness CAT No. 1540 110). The solvent from the crude extracts were removed by using a rotary vacuum evaporator with the water bath temperature of 50°C. Finally, the residue of dried leaves and stems were collected in a vial and stored in refrigerator at 4°C for subsequent usage [9].

Culturing and Preparation of Media: The already isolated and identified *Escherichia coli* bacterial strain was cultured. The strain was refreshed for 24 hrs by broth culture in the test tube. Mueller Hinton Agar was prepared for cultured the strains and drilling wells on the agar, impregnated with 100μml of extraction was applied on the surface of the agar and the plate incubated overnight at 37°C [10].

Inhibition zone diameter of acetone extraction was 55mm, but control group was 10mm and methanolic extraction was 60mm, but control group was 35mm.

RESULTS

Leaves and stem extracts of tifirgina exhibited moderate degrees of antibacterial against *Escherichia coli*, under the laboratory conditions. The results are presented in figures1and2and are clearly suggesting that dried leaves and stems acetone and methanol extracts of *Gomphocarpus purpurascens* A. Rich have excellent antibacterial properties against *Escherichia coli*.

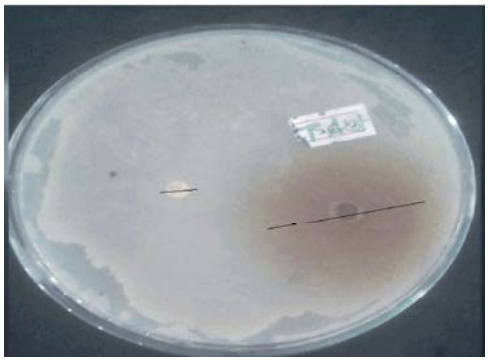

Fig. 1: Description: Type of organism is *E. coli*, control group vancomycin and tested by acetone extraction. Inhibition zone diameter of acetone extraction is 52mm but control group is 10mm. The line indicates inhibition zone length by mm.

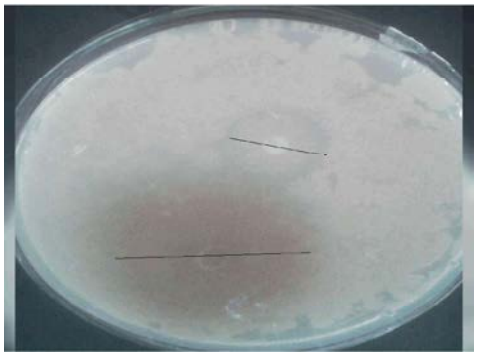

Fig. 2: Description: Type of organism is *E. coli*, control group vancomycin and tested by methanolic extract Inhibition zone diameter of methanolic extract is 60mm but control group is 35mm.The line indicates inhibition zone length by mm

Inhibition Zone Diameter Interpretation for Vancomycin *Susceptible:* >12*, Intermediate:* 10-11*, Resistant :*< 9. From the above interpretation in figure (1) Vancomycin is intermediate to *E. coli*, but in figure (2) vancomycin is susceptible for *E. coli*, this variation may be technical problem. But, both new extracts are susceptible for *E. coli*.

DISCUSSION

This was the first report of laboratory evaluation of antibacterial activity of *Gomphocarpus purpurascens* A.Rich leaves and stems extracts against *Escherichia coli* in University of Gondar, Ethiopia. To the best of my knowledge, there was no record of laboratory evaluation of antibacterial activity of *Gomphocarpus purpurascens* A.Rich leaves and stems extracts against *Escherichia coli* in the literature. The application of acetone and methanolic extracts was effective and safe. However, methanolic extract has shown quite remarkable antibacterial activity than acetone extract.

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