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In-Vitro Antibacterial Study of Fagonia Cretica

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Abstract–The aim of the present research was to evaluate the antimicrobial potential and phytochemicals profile of Fagonia cretica plant to look into possible natural therapy agents. Different extracts of the plant were tested against bacterial pathogens namely Escherichia coli, and Pseudomonas aeruginosa. The extracts of our research plant exhibited moderate activities showing 13 mm to 16 mm inhibition against different tested pathogens as compared to control which gives a maximum of 27 mm inhibition. The Fagonia cretica is found to be good source of alkaloid, flavonoids, tennins, resins, carbohydrates, proteins, glycosides, coumarin, terphenoids and steriods. Anthranol glycosides and starch were found to be absent in the plant. The presence of phytochemicals in our research plant is the possible answer to its active antimicrobial profile. The bioactive extract of the plant can be further used for isolation of natural products from the plant and to add a number of valuable compounds to Phytochemistry and pharmaceutical industries.

***Keywords: In-vitro, Fagonia cretica, Antibacterial*.**

I. INTRODUCTION

Plants are the beauty of nature and these plants have great economic and medicinal importance throughout the world. Almost all daily human basic and luxurious requirements like feeding, clothing, sheltering, nursing, and hunting are fulfilled by plants. As plants are sources of medicines, they have formed the basis for innovative and traditional systems and continuously providing mankind with new remedies. In previous few years, the interest in traditional medicine has highly increased. This discipline is gaining the scientific basis for its appropriate application [1]. Herbal medicines have been the main source of primary health care in many nations. The plants as medicine are used in different system of medicines such as ayurveda, allopathy, Unani, Homeopathy and even in other system. The history of plants to be utilized as medicines is thousands of years old [2]. About 80% of the world population is still dependent on traditional medicine. From ancient times, plants have been a rich source of effective and safe medicines. Due to their safe, effective and inexpensive nature, indigenous remedies are popular among the people worldwide. We may call herbal medicine as the medicine in which plant based formulations are used to alleviate diseases. It is also known as botanical medicine or phytomedicine. Latterly phytotherapy has been introduced as more accurate synonym of herbal or botanical medicine. In the early twentieth century herbal medicine was prime healthcare system, as antibiotics or analgesics were not as yet discovered. With the advent of allopathic system of medicine, herbal medicine gradually lost its popularity among people, which is based on the fast therapeutic actions of synthetic drugs [3].The importance of medicinal plants and traditional health system in solving the health care problems of the world is gaining increasing attention. Because of this resurgence of interest, the research on plants of medicinal importance is growing phenomenally at the international level, often to the detriment of natural habitats and mother population in the countries of origin. Most of the developing countries have adopted traditional medical practice as an integral part of their culture. Historically all medicinal preparations are derived from plants, whether in the simple form of raw plant materials or in the refined form of crude extracts, mixtures, etc [4].*Fagonia cretica* L., a member of the family Zygophyllaceae, is a small spiny under shrub mostly found in dry calcareous rocks throughout Pakistan [5].Fagonia cretica is astringent, febrifuge and prophylactic against small-pox. The plant is bitter and used for the treatment of fever, thirst, vomiting, dysentery, asthma, urinary discharges, liver trouble, typhoid, toothache, stomach troubles and skin diseases. Boiled residue of the plant in water is used to induce abortion. It is externally applied as a paste on tumors and other swellings of the neck. An aqueous decoction of the plant is a popular remedy for cancer in the indigenous system of medicine, but no scientific attempt has yet been made to evaluate the effects of its extracts [6-7].The present study recommended that *Fagonia cretica*is significant plant from medicinal point of view and Plants based on antimicrobial studies have enormous therapeutically potential as they can serve the purpose without any side effect that already is associated with synthetic antibiotics.

II. MATERIALS AND METHODS

Collection of Plant Material

Fresh plants of *Fagonia cretica* and was collected from District Karak, Khyber Pakhtunkhwa, Pakistan. The plant was authenticated by the Department of Botany, Hazara University Mansehra, Khyber Pakhtunkhwa, Pakistan. Fresh plant materials were washed under running tap water air dried and then was homogenized to fine powder and stored in airtight bottles.

Extraction and Fractionation

The shade-dried whole plant material of *Fagonia cretica* was soaked in methanol for 10 days. The powdered drug was extracted with 80 % methanol three times and filtered at room temperature. The filtrate was evaporated in rotary to get a dark-greenish residue (extract), which was further suspended in DMSO.

Antibacterial activity

For antibacterial activity bacterial strains were taken from the Microbiology laboratory of Department of Microbiology, Hazara University Mansehra, Khyber Pakhtunkhwa,Pakistan. These bacterial strains were subculture on the nutrient agar.

Preparation of inoculums

A loopful bacterial culture was immersed in the distilled sterile water to form the dilution of inoculums.

Antibacterial activity

The nutrient agar plates were prepared and left for solidification. Then wells were formed by using sterile cork borer. The plates were then inoculated by the bacterial cultures using the sterilized swabs. The wells were filled with the plant extracts (100 µl in each well). For positive control CRO was added to the center of the nutrient agar plate. The Petri plates were incubated for 24 h at 37 °C. After incubation the Petri plates were checked for different zone of inhibition formed by the plant extracts.

III. RESULTS

Total of four extracts of *Fagonia cretica* (Methanolic and Ethanolic) were used to evaluate the antibacterial profile of the plant. The antibacterial assay shows that all of the extracts were found to be active against the tested pathogens but all the fractions of our research plant were potentially active against *E.coli* when compared with positive control, showing almost 100% inhibitions.The antibacterial disc which was used as positive control in the research work to detect the sensitivity of bacterial strains used also showed zones of inhibition against the four bacterial strains. Positive control has maximum zone of inhibition against *E. coli ATCC* (27mm) and minimum zone of inhibition against *Pseudomonas ATTC(13mm)*which is shown in (Table 3.1).

Table 3.1: Zone of inhibition (mm) of Root and Leaves extracts of *Fagonia cretica* against selected bacterial strains

S. No	Bacteria Strains	Zone of Inhibition				
		Methanolic (Root)	*Methanolic (leaves)*	*Ethanolic (Root)*	*Ethanolic (leaves)*	*Positive Control*
1	*E.coli ATTC*	14	10	13	8	27
2	*E. coli MDR*	14	10	11	8	25
3	*Pseudomonas ATTC*	13	12	11	7	13
4	*Pseudomonas MDR*	12	11	10	6	16

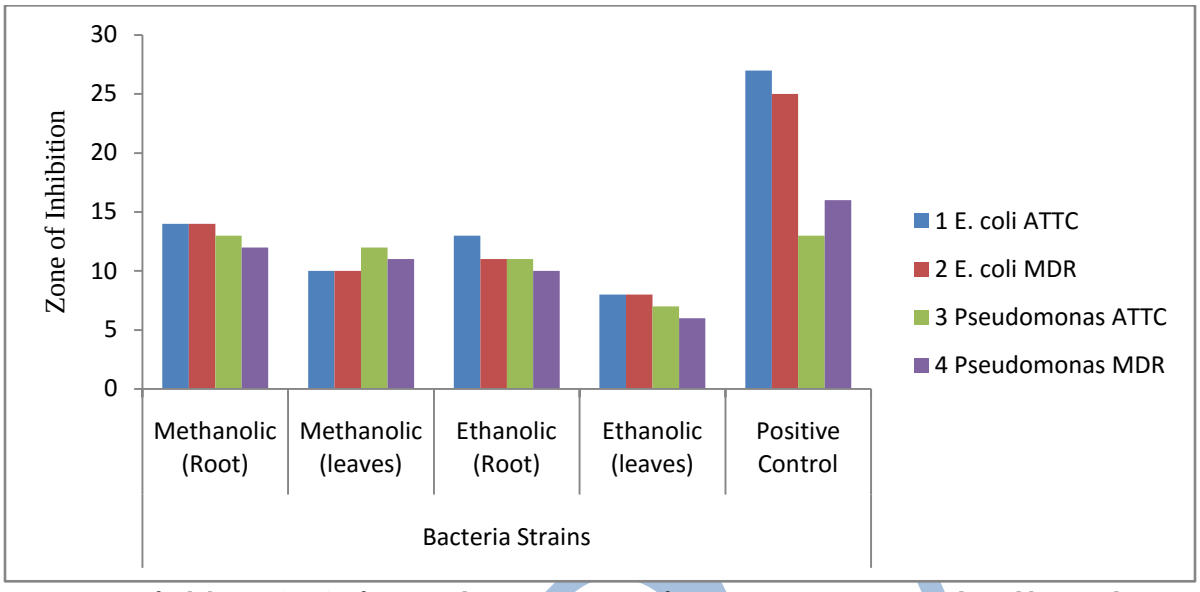

Fig 1: Zone of inhibition (mm) of Root and Leaves extracts of *Fagonia cretica* against selected bacterial strains

It also reveals that the bacterial strains used for the activity were fully active. The overall activity also shows that Methanolic extract of the plant shows maximum activity against all the strains (Fig 3.2-3.5).

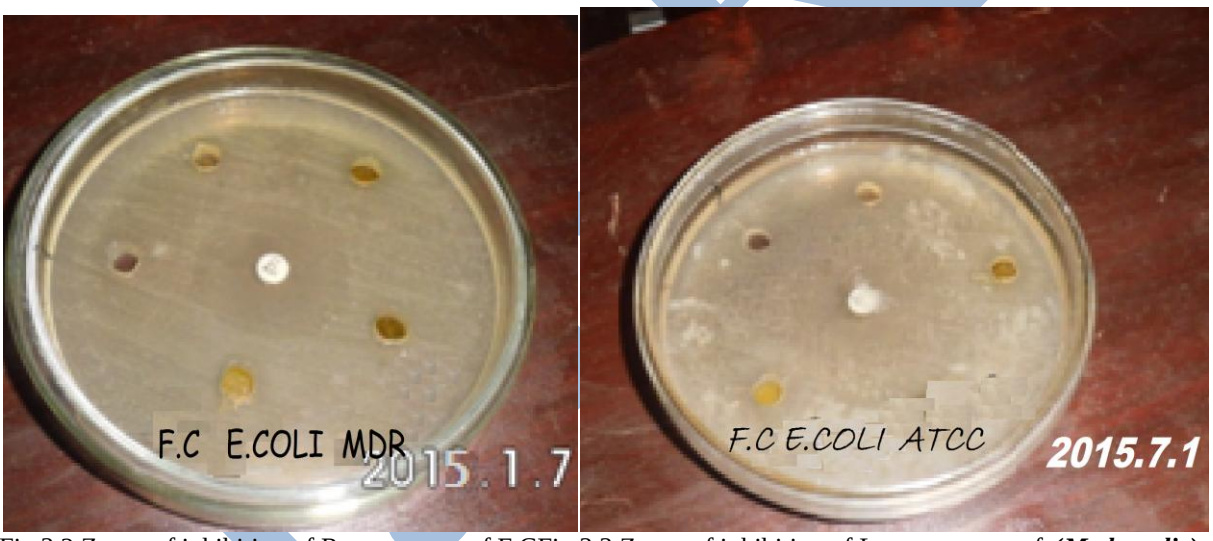

Fig 3.2.Zones of inhibition of Root extracts of F.CFig 3.3.Zones of inhibition of Leaves extract of **(*Methanolic)*** Against *E. coli* F.C**(Methanolic)** Against E.coli

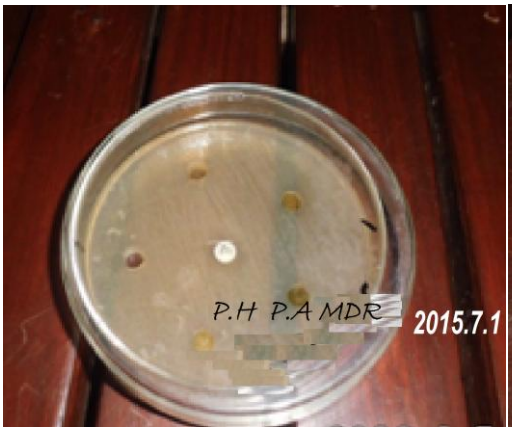

Fig3.4. Zones of inhibition of Root extract of F.C ***(Ethanolic)*** Against *Pseudomonas*

Fig 3.5. Zones of inhibition of Leaves extract of F.C ***(Ethanolic)*** against *Pseudomonas*

IV. DISCUSSION

Natural alternative treatments for fungal and bacterial infection may provide a pathway for the development of new antimicrobial agents. This study indicated that all the four fraction of *Fagonia cretica*was more potent against bacteria. This study emphasizes that the medicinal plant*Fagonia cretica* is active against*E.coli ATTC,E. coli MDR,Pseudomonas ATTC Pseudomonas MDR* strains. However, this finding was consistent on repeated experiments and warrant further investigation. Inhibition zone sizes that were obtained that support the finding of the well diffusion method. Since the activity was demonstrated in all extraction, they indicate a potential source of antimicrobial agent and should be studies further. Further studies will determine what compounds are active in the various extracts. However, extracts of *Fagonia cretica*may be a target for investigation since it has been shown to contain compound with bioactivity. The bioactive compounds may not be limited to those already identified. The plant crude extract were subjected to antibacterial activities. For antibacterial activities four bacterial strains *E. coli ATTC, E. coli MDR, Pseudomonas ATTC Pseudomonas MDR*were used in antibacterial assay.The growth of four bacterial isolates was inhibited by four extracts.Highest activity was Methanolic Extract which give wide zone of (27mm) against*E.coli ATCC.*

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