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Studies of Antibacterial Activities of *Glycyrrhiza glabra* Root Extract

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Abstract: The licorice plant (*Glycyrrhiza glabra* Family *Leguminoceae*) has been used by physician and herbalists since the earliest of times. It is also knows as "sweet roots", which contains a compound that is roughly 50 times sweeter than sugar .Many of the claims for the effectiveness of licorice extracts have been shown by modern science to be credible, a root component (Glycyrrhizin) being generally regarded as the major biologically-active principle. Licorice extracts have been widely used in pharmaceutical and confectionery industries because of the presence of glycyrrhizin.
A study was conducted to determine the antibacterial activities of Licorice root extract in ether, chloroform, acetone on bacteria using the well diffusion method. The extracts showed significant antibacterial activities against two gram-positive (*Bacillus subtili and Stapphylococcus aureus*) and two gram-negative (*Escherichia coli and Pseudomonas aeruginosa*) bacteria.
It can be used in the folk medicine at different parts of the world to treat many diseases including bacterial infections.
Key words: *Glycyrrhiza glabra,* extract of roots, Antibacterial activity.

Introduction

For centuries plants have been used throughout the world as drugs and remedies for various diseases. Licorice (or liquorice) is a plant of ancient origin and steeped in history. It grows in subtropical climates in Europe, the Middle East, and Western Asia. Licorice extracts and its principle component, glycyrrhizin, have extensive use in foods, tobacco products, and snuff, and in traditional and herbal medicine. Licorice or Liquorice(*Glycyrrhiza glabra*), is a perennial herb which possesses sweet taste [1]. Liquorice has extensive pharmacological effects for human being. The most common medical use liquorice is for treating upper respiratory ailments including coughs, hoarseness, sore throat and bronchitis.[2, 3]

Medicinal uses of licorice includes cough suppression,[4] gastric ulcer treatment[5], treatment of early Addison disease[6,7], treatment of liver disease[8,9] and as a laxative. The anti-ulcerative activity has been demonstrated extensively and in China and Japan, licorice is clinically for the treatment of stomach ulcers[10, 11]. Its preparations are used as a conditioning and flavoring agent in tobacco products. So far more than 80 different constituents of liquorice preparations (flavonoids, chalcones and coumarines) have been identified. Glyzyrrhizic acid or glycyrrhizin is the main biologically active compound of the liquorice root. Glycyrrhizin possesses a sweet taste and sweetness-potentiating characteristics and have been employed industrially[12].

Health hazard of Glycyrrhizic acid present in liquorice were evaluated by some researchers[13]. *Glycyrrhiza glabra* has shown promise as a memory enhancing agent in mice[14]. A process for extraction of natural sweetener from licorice (*Glycyrrhiza glabra*) roots is suggested[15].

The healing power of herbs was reviewed by Murray MT[16]. The effect of glycyrrhizin (GR) on HIV replication in cultures of peripheral blood mononuclear cells (PBMC) from HIV-infected patients was investigated [17].

The antioxidant and antimicrobial constituents of licorice were studied by some researchers[18]. The antimicrobial flavanones from the leaves of licorice were studied by Fukui, H., K, et al [19]and Li W. Y[20].

Here an attempt has made to study the antibacterial effects of organic extracts of licorice roots.

Sr. no	Name of micro organism
1)	*Staphylococcus aureus*
2)	*Bascilus subtilis*
3)	*E. coli*
4)	*Psudomonas aerugenosa*

Material and Method:

Plant material:

Dried roots of licorice were procured from Pandharpur (Maharashtra) and were authenticated from Prof. Dr. C. S. Suryavanshi (Taxonomist), Dr. Babasaheb Ambedkar University, Aurangabad (Maharashtra). The roots were powdered in a mixer grinder. The powder of roots was packed in paper bag and stored in air tight containers until use.

Preparation of extract:

Powered material was extracted with chloroform, acetone and ether by soxhalation method. Various extract s were evaporated in hot air oven at 45^0 C over a night. Extract is then used for further antimicrobial assay.

Antimicrobial study[21]:-

All the microbial strains are collected from Department of Microbiology of our College

Following table showing the microbial strains used.

Antimicrobial assay:-

Agar well-diffusion method: the agar diffusion method was used to screen the antibacterial activity of all extracts of roots of *Glycyrrhiza glabra*. Seeded broth containing test organism was inoculated on plats of solidified agar and spread uniformly. The 5 wells were cut in the agar layer of each plate with an aluminum bore of 6 mm diameter. In every plate 3 different extracts of concentration 1.2mg/ml in respective solvents (ether, chloroform and acetone). The concentration of tetracycline used for all agar plates as standard 5mg/ml and the concentration of streptomycin used was 7.5mg/ml.One positive control for each micro organism was prepared by adding nutrient broth with respective microorganism inoculums. Then all plates were incubated at 37^0C ± 1for 24 hours. After the incubation period the mean diameter of the zone of inhibition in mm obtained around the well was measured which has been shown in table.

Result and discussion

The extracts of the roots of *Glycyrrhiza glabra* has shown magnificent antibacterial effect.

Although ethereal extract has shown good effect on *E. Coli* strain. The acetone extract has shown excellent effect than Streptomycin. Overall the acetone extract of the roots has shown significant antibacterial effect on studied organisms.

Conclusion

Glycyrrhiza glabra belonging to family Leguminoceae is well known for its expectorant and demulcent activity. From the above study we can also conclude that it also exhibits good antimicrobial activity against various bacterial strains.

Observation table: Zone if inhibition in mm

Extracts → **Microbial strain ↓**	**Eth**	**Ace**	**Ch**	**Strepto**	**Tetra**
Gram + ve					
Staphylococcus aureus	22	32	18	26	25
Bacillus subtilis	19	22	16	22	34
Gram -ve					
Pseudomonas aerugenosa	14	22	14	31	32
E. Coli	16	15	11	22	36

Note: Eth: Ether, Ace: Acetone, Ch: Chloroform, Strepto: Streptomycin, Tetra: Tetracyclin

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