Original Research Article

A Study of Chemical Composition and Bioactivity of Folk Medicinal Plant: Teucrium Polium

Abstract

Investigating the chemical composition and bioactivity of Teucrium polium, sometimes referred to as Germander, was the goal of the current study. Analysis was done on the T. polium extracts. Numerous chemical components found in it contribute to its therapeutic qualities. Flavonoids, terpenoids, essential oils, and other substances with antioxidant and anti-inflammatory qualities are among these chemicals. They possess a vast array of therapeutic applications and have long been used to cure a range of ailments. The ethanol extract outperformed the hexane extract in terms of activity or in other words Hexane extract was less active than ethanolic extract on all other microorganisms. The hexane extract exhibited a 23 mm inhibitory zone and high antibacterial activity against Escherichia coli. Despite this, the extracts' zones of inhibition for Pseudomonas aeruginosa and Escherichia coli were comparable in size (23, 24, and 23 mm, respectively). The clinical, pharmacological, and research in medicine sectors, along with the food as well as cosmetics industries, can all benefit from the substantial biological activity of T. polium extracts.

Keywords: Antibacterial activity, Hexane, Teucrium polium, Escherichia coli, Pseudomonas aeruginosa.

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1- Introduction

Several diseases can be effectively treated with the help of bioactive substances found in plants, such as phenols, aromatic components, terpenoids, sterols, essential oils, alkaloids, tannins, and anthocyanins. The kind and quantity of a plant's elements determine its biological activity. The therapeutic herbs' biological function —their antibacterial, antifungal, anti-aging, anticancer, as well asantioxidant qualities—has drawn particular interest in recent years. Because of their reducing power, ability to scavenge free radicals, and potential to inhibit the generation of singlet oxygen, polyphenolic chemicals found in medicinal plants exhibit antioxidant activity. Antioxidant chemicals can be utilised as dietary supplements and are known to protect against a variety of degenerative disorders.Furthermore, natural

antioxidants that are required to make functional foods or to enhance the nutritional value of processed meals are of interest to food manufacturers and functional food manufacturers. Numerous studies have shown that a variety of medicinal plants are important sources of compounds with antibacterial and antioxidant properties that can shield the body against a range of pathogens and cellular oxidation events. Some therapeutic herbs can be suggested as suitable assets as novel antimicrobial agent investigations since these compounds can inhibit and control infections that do not cause severe toxicity to cells. As a substitute, herbal remedies and natural chemicals can be employed as helpful and more significant treatments for inflammatory disease prevention and therapy. The anti-inflammatory qualities of medicinal plants are associated with natural antioxidants such polyphenols, flavonoids, carotenoids, tocopherols, and ascorbic acid[1-2].

Germander, or Teucrium polium, is a hardy plant that needs little water since it thrives in arid climates and can tolerate severe circumstances. This plant, which usually grows to a height of 10 to 30 cm, is distinguished by its small leaves, bushy look, and clusters of tiny pink or white flowers. It is mostly found in North Africa, areas of Western Asia, and the Mediterranean region. Germander has a wide range of therapeutic uses and has long been used to treat conditions including inflammation, excessive blood sugar, and digestive issues. According to recent research, the plant has active substances such terpenoids and flavonoids that support its anti-inflammatory and antioxidant qualities [3].

In Iranian traditional medicine, T. polium is used to treat a variety of pathological illnesses, such as diabetes, rheumatism, gastrointestinal issues, and inflammations. Its tea is used to cure a number of illnesses, including urogenital disorders, indigestion, the common cold, and stomach discomfort. Aqueous extracts from the aerial portions of T. polium are used as an anti-diabetic medication by many individuals with type 2 diabetes, particularly in Southern Iran. In many Arabian nations, the aqueous extract is also frequently used in traditional medicine to heal stomach ulcers. Locals use infusions of T. polium's aerial parts and delicate leaves in Saudi Arabian traditional medicine to treat intestinal, febrifuge, stomach, and vermifuge issues. They are also used in steam baths to cure colds and fevers. T. polium is used in Jordan to cure a number of illnesses, including kidney stones, diabetes, cancer, rheumatism, pain, inflammation, and fever. Its aerial portions' injections are used to treat haemorrhoids and eczema in Turkish traditional medicine [4-7]. Numerous compounds were identified, tested for antibacterial activity, and also examined for the impact of different temperatures, soil moisture levels, and light intensities on the germination of Teucrium

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polium seeds. The current study's primary goal was to evaluate the chemical composition in order to do this, and the extracts' antibacterial and anti-inflammatory properties were examined.

2- Material and Methods

Collected the sample of Teucrium polium plant leaves and bark from and near the University of Tabuk area and prepared the extract of the sample for investigation. The extracts were analysed using gas chromatography and tested for the antibacterial properties of Teucrium polium extract as well. The extract sample weighed one hundred and fifty grammes, and following put a bit of the material in a filter crucible and weighed it. It measured 50 grammes after seven hours in the Allihn condenser. GC-MS was used to identify and quantify the different Sami volatile organic components present in the T. polium samples. This study investigated at how Teucrium polium seed germination was affected by various temperatures, soil moisture contents, and light intensities. This investigation examined Teucrium polium extract's capacity to stop the development of several bacterial strains. The extract was tested against a variety of pathogens, including Staphylococcus and Escherichia coli [8-9].

3- Result and Discussion

The findings of the various compositions found in the Teucrium polium plant extracts obtained for examination. The Teucrium polium plant contains a variety of chemical compounds that contribute to its medicinal properties. These compounds include flavonoids, terpenoids, and essential oils, as well as other components. It has a variety of chemical components that contribute to its therapeutic qualities.These substances, which include flavonoids, terpenoids, essential oils, and other anti-inflammatory and antioxidant components, can be seen in **Table 1.**

Table-1 A list of Semi Volatile Organic Compounds (SVOCs)

Compounds	**Units**	**Results [**Mg/L**]**
Naphthalene, 2-methyl	Mg/L	0.07428
Carbazole	Mg/L	0.0488
Acenaphthylene	Mg/L	0.0403
Anthracene	Mg/L	0.0207
Dimethyl phthalate	Mg/L	0.0199
Pentacene	Mg/L	0.0118
Isophorone	Mg/L	0.0113
Azobenzene	Mg/L	0.0102

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3-Nitroaniline	Mg/L	0.0145
Phenol, 4-chloro-3-methyl	Mg/L	0.0050
Phenol, 2,4-dimethyl	Mg/L	0.0032
Benzo[ghi]perylene	Mg/L	0.0027
Benzo[k]fluoranthene	Mg/L	0.0023
Benzyl butyl phthalate	Mg/L	0.0024
Phenol	Mg/L	0.0021
Benzo[b]fluoranthene	Mg/L	0.0020
Dibutyl phthalate	Mg/L	0.0016
Bis(2-ethylhexyl) phthalate	Mg/L	0.0015
Naphthalene	Mg/L	0.0014
Benzene, 1,2-dichloro	Mg/L	0.0014
Benzene, 1,4-dichloro	Mg/L	0.0013
Naphthalene, 2-methyl	Mg/L	0.0013
Methane, bis(2-chloroethoxy)	Mg/L	0.0012
Acenaphthylene	Mg/L	0.0009
Benzo[a]pyrene	Mg/L	0.0007
Fluoranthene	Mg/L	0.0004

Teucrium polium contains chemicals called flavonoids. Traditional medicine uses it to treat digestive diseases, including diarrhoea, indigestion, and bloating, because it contains flavonoids that have an antispasmodic impact on the intestines. Teucrium polium's traditional usage to treat digestive issues, including diarrhoea, is enhanced by its tannins, which include flavonoids with anti-inflammatory and antioxidant properties, including quercetin and apigenin. Teucrium polium is useful in lowering swelling and discomfort related to inflammation, particularly joint and respiratory inflammations, since it contains substances with anti-inflammatory qualities, such as polyphenols and flavonoids. Due to its antioxidant properties, ability to raise insulin secretion, and ability to lower blood glucose levels in diabetics. May lower blood levels of triglycerides and cholesterol, hence lowering the risk of cardiovascular diseases [10].

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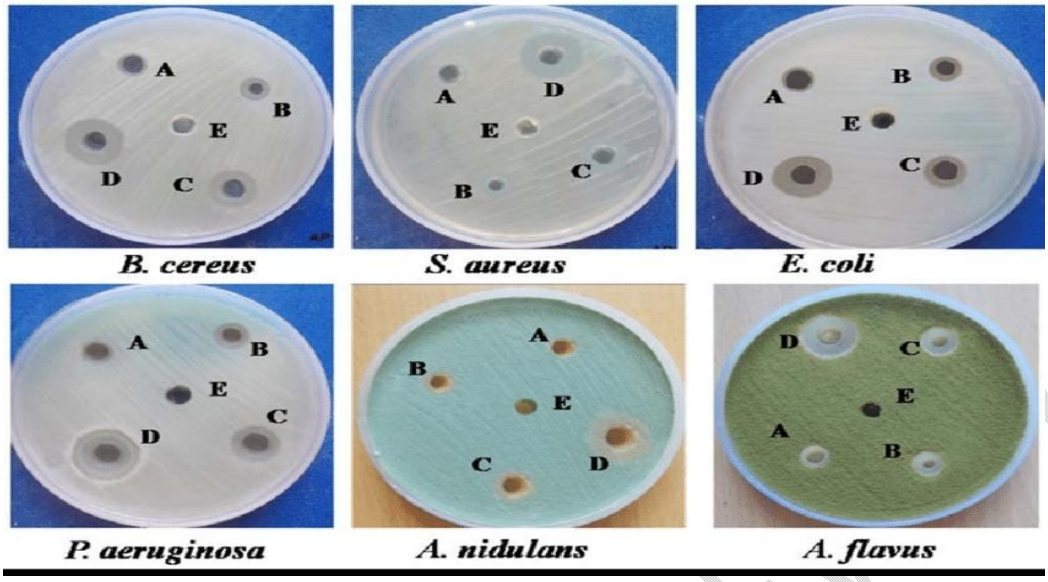

Figure-1.**Teucrium polium as an antibacterial agent.**

Using the agar disc diffusion technique, the antibacterial activity of T. polium aerial extracts was examined against both Gram-positive and Gram-negative bacteria. Shown suitable antibacterial activity against the types of microorganisms under study. These extracts were shown to have more biocidal action against strains of Gram-positive bacteria than strains of Gram-negative bacteria.Teucrium polium extract's capacity to stop the development of several bacterial strains. It gave a positive result against Staphylococcus and Escherichia coli as well [11-12]. So, it's extracts have a potential antibacterial agent that was demonstrated by its ability to suppress the development of specific bacterial strains, can be seen in **Figure-1**.

In terms of activity, the ethanol extract performed better than the hexane extract. The hexane extract demonstrated strong antibacterial activity against Escherichia coli and an inhibitory zone of 23 mm. Nevertheless, the Pseudomonas aeruginosa and Escherichia coli zones of inhibition for the extracts were similar in size (23, 24, and 23 mm, respectively). On every other microbe, ethanolic extract was more active than hexane extract.

4- Conclusion

Thisstudyreportedthechemical composition and bioactivity of Teucrium polium extracts collected in the Tabuk region. The largest concentrations of several phytochemical

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components (phenolics, flavonoids, alkaloids, and saponins) were found in this extract. The findings from that investigation's extract analysis established that the T. polium extracts exhibited the proper antibacterial activity. The ethanol extract outperformed the hexane extract in terms of activity. With an inhibitory zone of 23 mm, the hexane extract showed significant antibacterial activity against Escherichia coli. However, the extracts' zones of inhibition for Escherichia coli and Pseudomonas aeruginosa were comparable in size (23, 24, and 23 mm, respectively). Ethanolic extract outperformed hexane extract on all other microbes.According to the investigation's findings, T. polium extracts have strong biological activity, making them suitable for usage in healthcare facilities, pharmaceutical manufacturing, medical research, and the food and cosmetics sectors.

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