

Antibacterial Aromatic Substances

¹Hulya Celik,²Zelal Karabulut

*Ağrı Ibrahim Cecen University, Faculty of Pharmacy Basic Pharmaceutical Sciences Department /
Fundamental Sciences of Pharmacy 03200 Agri/TURKEY*

ABSTRACT : Chemistry is a central science that has served mankind since the existence of humanity. From past to present, many innovations have entered our lives together with chemistry. Everything we see, touch, wear, eat and drink is actually chemistry. Aromatic chemistry, on the other hand, constitutes the subgroup of chemistry that we call benzene ring-bearing arenes and contains most of the bioactive substances. The majority of substances that destroy or stop bacteria that are harmful to human health are aromatic organic substances. Plants are the rich source of antibacterial aromatic compounds. There are antibacterial effective compounds in the leaves, roots, stems, latex they secrete, essential oils and many other products produced from the plant, and these are mostly aromatic in nature. Our study is a small screening of medicinal Aromatic Plants with antibacterial effect containing aromatic structure.

KEYWORDS: Aromaticity, antibacterial action, medicinal plants

I. INTRODUCTION

What is an aromatic compound?

Aromatic compounds are chemical compounds (most commonly organic) containing one or more rings with completely delocalized pi electrons around them. The term "aromatic" was formerly coined from the physical properties of many compounds, such as having a sweet odour. But not all aromatic compounds have a sweet smell, and not all sweet-smelling compounds are aromatic compounds. The vast majority of aromatic compounds contain carbon but do not have to be hydrocarbons. The structure of some atomic rings in organic chemistry is more stable than expected. Aromaticity is a property with higher stability than would be expected from a conjugated ring consisting of unsaturated bonds, lone electron pairs, or vacant orbitals. Aromatic compounds have an important place in the industry (paints, drugs, cosmetics, supplements, etc.). Aromatic compounds also play key roles in the biochemistry of all living things(1).

Medicinal Aromatic Plants : When people in history were looking for a cure for diseases, they thought they should be protected directly from the source of the danger. They have chosen the way to overcome the dangers from nature and diseases with remedies from nature. The first sources of medicinal and aromatic plants were written by the Chinese in the 3000s BC. The oldest source of recognition of these plants in our country; It is a 5-volume work titled "Law" in the 11th century by ibn Sina, the great Turkish-Islamic scholar. In the 2nd volume of this work, various drugs are mentioned (2). Today, the term "medicinal and aromatic" plants is often used together. Medicinal and aromatic plants are plants that are used as medicines to prevent diseases, maintain health or cure diseases (3). Medicinal aromatic plants have been carrying beneficial substances for health since the date of humanity (4). Synthetic materials, which have caused many deadly diseases such as cancer in recent years and are widely used in the food and beverage industry are increasing the demand for organic and natural foods (5). Worldwide, between 50,000 and 75,000 plant species are used in traditional and modern medicine [6]. Medicinal and aromatic plants constitute an average of 1000 of the more than 10,000 plant species detected within Turkey today. Medicinal aromatic plants constitute the raw material of perfume, cosmetics, soap, ciklet, sugar, tea, cleaning product, pesticide, herbicide and many other industries, especially in the pharmaceutical industry (7). Medicinal plants are often used to prepare drugs used for treatment against various diseases (8). People have always tried to use plants to survive, treat patients and develop drugs (9).

What is the antiseptic and antibacterial effect?

With the publication of John Lister's article Antiseptic Principle of the Practice of Surgery in 1867, the widespread use of antiseptic surgical methods began. In his article, he advocated the use of carbolic acid (phenol) to ensure that any existing microbes were killed. However, similar ideas have been put forward by different experts before, since time immemorial; Like Galen and Hippocrates in ancient Greece. In fact, similar techniques were found to be defended in a Sumerian clay tablet dating back to 2150 BC (10). Antiseptics are anti-microbe (antimicrobial) substances applied to living tissue to prevent infection, septicaemia or decay. They

should not be confused with antibiotics that kill microorganisms in the body and disinfectants used to kill microorganisms found in non-living objects. While some antiseptics are really germ-killing, that is, they can kill germs (bacteriocidal), others are bacteriostatic and simply prevent or suppress the development of microbes. Antibacterials are antiseptics that can only be used against bacteria (10).

Essential Oils and Antibacterial Effect : Essential oils, also called essential oils, are complex structures obtained from various parts of plants (such as roots, stems, leaves) through destiation or pressing (11). Essential oils obtained from medicinal and aromatic plants are used to create antibacterial properties on textile surfaces. Essential oils are generally liquid and volatile at room temperature. They are sensitive to light and air. They are inclined to oxidation. They are colorless or light in color and have a sharp odor. Essential oils are the immune systems of the plant on which they are found. Protects them from bacteria and viruses, delivers oxygen to the necessary places, transmits nutritious food to the relevant units (12, 13). Today, it is widely seen in perfume, cosmetics, food and beverage industry, home cleaning products (14). With the increasing interest in aromatherapy and pharmacology, the antibacterial and antioxidant properties of essential oils have also come to the fore. There is a lot of research on the effects of these oils against poisoning microorganisms, molds, pathogenic yeasts and viruses, which have an important place in the control of plant and human diseases due to these characteristics (15).

Some Plants with Antibacterial Effect Aromatic Structure

Thymus (mint) Type : In recent years, it has been observed that essential oils, which are secondary metabolism products of plants, have antimicrobial, antibacterial, antifungal, antitoxigenic, antiviral, antiparasitic, antioxidant, anticarcinogenic and insecticidal properties. The main reason why essential oils show antibacterial properties are the phenolic compounds they contain. Some indications are that minor compounds play a critical role in antibacterial activity and are possible to have synergistic effects with other components. P-simen and γ -terpinen components in origanum and Thymus species are the leading substances of carvakrol and timol. Accordingly, it has been reported that p-simen, γ -terpinen, carvakrol and thymol are biologically and functionally closely related and the theory that timol is formed by p-simen from γ -terpinen in Thymus vulgaris is supported. Thymus essential oils are also used as a supporter in nutrition due to their antioxidant properties. Thymus essential oils are also used in the fields of medicine and pharmacology due to their antiseptic, antibacterial, antifungal, antispasmodic, antitussive, exorcism, analgesic properties (17).

Ferulago mughlae Peshmerga and Ferulago sandrasica Peshmerga and Quezel Species : The most common group of metabolites in previous phytochemical studies on ferulago species are coaxes, and these compounds are antioxidant, anti-inflammatory, antibacterial, antifungal, antiviral, anticancer, anticoagulant, anticonvulsant, it has been reported to have many effects such as neuroprotective, antiadipogenic, antitubercular, antihyperglycemic, antihypertensive and antidiabetic. *F. pachyloba*, *F. trachycarpa*, *F. bracteata* and *F. ostol*, imperatorin, bergapten, prantşimgin, pösedanol-2'-benzoate, grandivitol, suberosin, xantotoxin, felamidin, marmesin, isolated from extracts from *blancheana* plants and root dichloromethane extracts of these plants, umbelliferon is a mixture of ulopteroles and cohanin compounds and stigmasterol, β -cytosterol. aureus, E. coli, P. aeruginosa, B. subtilis and C. antimicrobial effect against albicans microorganisms was evaluated. Examples tested include prantshigin and *F. pachyloba* is the C. of the above-ground dichloromethane fraction. it has been reported to have the highest effect against albicans (18).

Licoy (Glycyrrhiza glabra L.) Antibacterial and Antioxidant Activities of the Plant : Licorice (*Glycyrrhiza glabra* L.) plant is a plant that is made of sherbet in Turkey, especially in the Southeastern Anatolia Region and is widely grown in nature. Six species grow in our country. The roots of the licorice plant are called licorice, and these roots are used in the production of sherbet, a drink specific to the region. After the bark of the roots is dried, it is used in the production of sherbet. The roots of the liance plant are biologically active and are a source of magnesium and silicon. Its composition has starch, sugars, glue, resin and glycerin. In some studies, it has been stated that it has antimicrobial effects. There's *glabra*. *glabra* and *G. There's glabra*. The extract prepared from the roots of *glandulifera* assets is e. coli, S. it has been reported to show antibacterial activity against aureus and *Mycobacterium smegmatis* (19).

Hünnap (Zizyphus jujuba Mill.) Antibacterial Effect of Fruit : Hünnap is a plant that is used as fruit grown in our country. It has a rich vitamin content. Since it contains antioxidants, minerals and phenolic compounds, it began to gain attention in our country. The antibacterial effects of methanol extract on standard bacterial origins were investigated for the antibacterial effect of the hünnap plant. The highest antibacterial activity in gram positive bacterial origins is S. with a 2 mg/ml MIC value. aureus was identified in the origin of 29213. aureus

43300, *E. faecalis* and *M. For smegmatis* origins, 8 mg/ml, 16 mg/ml and 8 mg/ml GCC values were found to be effective, respectively, while *E. faecium* and *Bacillus cereus* origins. MIC values in Gram negative bacteria of the hunnap; *E. coli* and *P. Aeruginosa* was determined as 64 mg/ml and 32 mg/ml respectively for its origins, while for other Gram negative bacterial origins was 64 mg/ml. It was determined that the hunnap with high MIC values had a weak antibacterial effect against gram negative bacterial origins (20).

Antibacterial, Antiviral and Antioxidant Activity of Propolis : Propolis, also known as "bee glue", is a sticky bee product produced by honeybees (*Apis mellifera*) by collecting resin and wax collected from the local flora to protect and repair their hives. In fact, bees use propolis for disinfection of hives, to protect them from insects and microorganisms, to close cracks or open gaps in the hive, to flatten the inner walls. Since time immemorial propolis has been used extensively by humans, especially in traditional medicine, to treat various diseases. Due to its antibacterial effectiveness, propolis in Europe became very popular between the 17th and 20th centuries. The most interesting substance is flavonoids. Flavonoids are ubiquitous natural compounds containing large amounts of low molecular weight polyphenolic substances that benefit human health due to their biological properties. These compounds are more biologically active and are known to have propolis antiseptic, antimycotic, spasmolytic, bacteriostatic, choleric, anti-inflammatory, anesthetic and antioxidant properties. In vitro antibacterial activity, against several gram-positive and gram-negative bacteria verified. Propolis acts as a bactericidal agent to stop the division of bacterial cells and protein synthesis, destroying the cell wall and bacterial cytoplasm. In addition, the current composition of propolis has been confirmed by many studies that it inhibits the entry of the virus into cells, creates distortion in viral replication, and shows antiviral activity by causing the destruction of RNA before or after its release in cells (RNA) (21).

Sarimsak (*Allium sativum* L.) : The earliest records on the use of garlic were written by Sumerians in 2600–2100 BC. Its origin is Central Asia. It is common in Indian and Chinese inscriptions. It was consumed as the main source of food in the construction of Egyptian pyramids. The first clues to the antimicrobial properties of garlic were proven by the French in 1721. In the Middle Ages, physicians wet the mask they wore on their faces with garlic to protect themselves from infectious diseases. During the Second World War, Russian soldiers were placed crushed garlic on the wound to prevent wound infections. Some of the main substances that provide this effect are sulfur-containing compounds (allisin, alliin and ajoen) (22).

Zencefil (*Zingiber officinale*) : it is a flowering plant of the family Zingiberaceae, with thin long leaves, yellow-red color, which can grow up to one meter in length. Root or rhizomes of ginger are grown as spices and for medical purposes. In the study conducted by Sivasothy and his colleagues, the essential oils obtained by hydrodistillation method from the leaves and rhizomes of ginger were evaluated for their antibacterial activity using microdilution technique. Accordingly, oils derived from root and rhizomes go from Gram-positive bacteria to *Bacillus licheniformis*, *Bacillus spizizenii*, *Staphylococcus aureus* and Gram-negative bacteria to *Escherichia coli*, *Klebsiella pneumoniae* and *Pseudomonas stutzeri* moderately effective. Another study on determining the effectiveness of ginger on similar bacteria found that the effect of ginger extracts against pathogenic bacteria increased in line with increased concentration, increasing the inhibition diameter (23).

II. RESULT

Antibacterial effect means curative effect against pathogens such as bacteria and viruses. Most antibacterial substances are aromatic substances and these aromatic structures are mostly found in plants. The aromatic antibacterial effect found in plants can be found in every part of the plant, as well as in the essential oil. For this reason, plants containing antibacterial agents are used as preparations, food supplements or pharmaceutical raw materials in the field of health for therapeutic purposes or in addition to treatment.

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