



NATURAL PRODUCT AND PHYTOTHERAPY (PAEONIA).

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ABSTRACT-

Natural products and phytotherapy represent an interdisciplinary approach to healthcare, emphasizing the therapeutic potential of plant-derived compounds. Natural products, including extracts, essential oils, and isolated bioactive molecules, have long served as the foundation of traditional medicine systems and modern pharmacology. Phytotherapy, a branch of herbal medicine, focuses on the clinical application of these natural agents for disease prevention and treatment.

This abstract explores the role of natural products in phytotherapy, emphasizing their mechanisms of action, such as inflammatory, antioxidant, antimicrobial, and infectious diseases. Additionally, the integration of advanced techniques like phytochemical screening, bioprospecting, and nanotechnology is discussed, enabling the development of standardized and bioavailable formulations.

Despite their potential, challenges such as variability in plant composition, lack of regulatory standardization, and limited clinical evidence remain. Addressing these issues through rigorous scientific validation and sustainable sourcing practices will be critical for advancing the role of natural products and phytotherapy. This holds the potential to revolutionize preventive and therapeutic health paradigms.

INTRODUCTION -

• In terms of plant diversity, Turkey is a very wealthy nation. Turkey's location within the three phytogeographic areas, topographic diversity, climatic diversity, and geological structure all contribute to this richness (Davis, 1965). Up until 1960, it was said that there were 3000-5000 species that naturally grow in Turkey. However, examinations and research conducted over the past 40 years have shown that the current number of these species is over 9000. With floral studies in Turkey were initiated, particularly during the 17th century. Later, the "Flora of Turkey and East Aegean Islands" by E. Boissier demonstrated the richness of our nation's flora. Numerous floristic investigations were conducted in an attempt to complete these studies. The study's findings indicate that Turkey's flora is significantly richer in terms of species when compared to that of Central and Western Europe (Donner, 2007). The genus *Paeonia*, which is the sole *Paeoniaceae* genus, is primarily found in temperate regions of western North America, southern Europe, and Asia. It comprises 52 recognized members (36 species, 15 subspecies, and 1 variety) globally (The Plant List Database, <http://www.theplantlist.org/>). According to the most recent taxonomy revision, there are 33 species and 26 subspecies of *Paeonia* in the world (Hong et al., 2010, 2011). According to Nasir and Ali (1978), underground tubers are used to treat hysteria, epilepsy, uterine disease, colic, bilious blockage, dyspepsia, and nerve disorders. For stomach complaints, dried flowers are utilized (Zaheer, 1966). The entire plant is used to treat eye conditions, cholera, vomiting, and tuberculosis. The tender shoots of *Paeonia emodi* are cooked and eaten as a vegetable. Various constituents isolated from *Paeonia* species have shown sedative and anti-inflammatory activities and are used for blocking effect on neuromuscular junction (Yu et al; 1990).

PHYTOTHERAPY

INDIGENOUS USE MEDICINAL PLANT-

Medicinal plants have been a key source of preparations for human medical therapies, both preventive and curative. Several plant species, including *Glycyrrhiza glabra* and *Papaver somniferum*, were listed in 2600 BC Mesopotamian clay tablets. These plants are continued in use today, either on their own or as an element in herbal formulations for the treatment of a variety of ailments. Plant medicine This practice has a long history, particularly among African tribes (see Table 1). Several plant species have been traditionally used to treat human ailments. These therapeutic herbs are taken in many forms, including teas, decoctions, herb powders, and preparations. Commonly treated diseases include headaches, stomach disorders, ulcers, sprains, bone fractures, measles, body aches, fevers, and coughs.

Traditional medicine has gained popularity in Africa during the past decade, largely due to the country's unsustainable economic position. Gender, age, ethnicity, education, and social status are all associated with the incidence of herbal medicines use. The World Health Organization (WHO) defines traditional medicine as "the sum total of the knowledge, skills, and practices based on the theories, beliefs, and experiences indigenous to different cultures, whether explicable or not, used in the maintenance of health as well as the prevention, diagnosis, improvement, or treatment of physical and mental illness." Medicinal plants have been used to treat and prevent diseases since ancient times. Ethnobotanical research is crucial for preserving

traditional medicinal cultures and understanding historical and cultural shifts. It is crucial for preserving traditional medicinal plant resources Table 1 shows therapeutic formulations used in traditional setting. [1]

PHYTOTHERAPY AND DRUG DISCOVERY-

Plant extracts include bioactive components that can operate at multiple levels in the body, restoring physiologic balance and combating illnesses. Plants have long been recognized as a valuable source of medicinal compounds in the pharmaceutical and biotechnology industries. Many contemporary medications are derived from plants (see Table 2). Medicinal plants have yielded almost 170,000 bioactive compounds, resulting in the development of around 70% of modern medications. Drug development from medicinal plants uses a multidimensional approach that includes botanical, phytochemical, biological, and molecular approaches. [2]

• PAEONIA IMPORTANT TYPE-

Different authors have mentioned Himalayan peony under many scientific names (table 1), however according to new guidelines (chan et al;2012; uzuner et al;2012), there can only be one acceptable scientific name for a given plant, with the remainder classified as synonyms. *P. emodi* royle is also known as *Ood-e-saleeb* (urdu) and *Mamekh* (Zaheer, 1966). It is found at altitudes ranging from 1800 to 2500 metres in Afghanistan and western Nepal. The plant is typically found in gregarious clusters in woods and shrubberies. Flowering takes place in April and May (Unani Pharmacopeia of India, 2007).

As a matter of fact, while Greece has the most endemic species with 800 in Europe, this number is more than 3000 in Turkey (Uyanık, 2013). Twelve thousand endemic plant species grow in the world and most of these endemic plants grow in Anatolian lands. About a third, that is, four thousand. Considering that there are two thousand 400 endemic plant species throughout Europe, the value of our existence is better understood (Anonymous, 2020a).

Turkey's abundant flora allows for a diverse range of geophytes. According to Kaya (2016), Turkey has around 900 geofits (bulbs, tubers, and rhizomes) and over 1000 plant species. *Paeonia* L. (*Paeoniaceae*) are perennial "peony" plants with colorful flowers and underground tubers (Ünlü, 2010).

Paeonia species are also known as 'Ayıgülü, Eşek Gülü, Bocur, Şakayık, Yer Şakayığı, Dağ Zambağı, Savul, Ayı Kulağı, Kavak Gülü, Kozluk Çiçeği, Orak Gülü Tombak' in Turkey

(Baytop 1994, 1999; Tuzlacı, 2006; Tanker et al., 2007). The only herbaceous kind of peony in our country; it is a perennial. The plant has tubers, blooms in various hues, and can grow up to 1 m. Herbaceous peony is recognized as the predominant gene in central Turkey. Flora Kaya (2010) reports the identification of 11 taxa and 54 populations. According to Baytop (1994) and Özhatay et al. (1998), our flora has six unique species whose tubers are exported. [3] Because cultivation techniques are unknown, tubers transported from nature are often indigenous or rare species that are on the verge of extinction. Inadequate research on peonies has hindered effective evaluation due to factors such as the number of species, geographical distribution, threats, breeding practices, and usage. The prospects remain unknown, and there was no contribution to the national economy. Currently, all regions of Turkey have been examined, and 54 populations have been located and cultured at elevations ranging from 500 to 2500 m on mountainous terrain. Only Turkey fluorescent *P. turcica*, unknown subspecies of *P. xkayae*, and other species have been imported internationally. Kaya (2010) highlights the distribution and population variations among *P. peregrina* species across several geographies. Henri Lenclerc, a French physician who lived from 1870 to 1953, coined the term "phytotherapy," which refers to the use of herbs in traditional Chinese and Indian medicine to heal patients. It is named after the journal *Presence Medical* (Sarışen et al., 2005; Sert et al., 2015). Inscriptions from 3000 B.C. show that some civilizations used herbal and animal remedies for therapy.

Rig Veda, a major representative of Indian medicine, mentioned over a thousand therapeutic plants in his writings around 2500 B.C., paralleling the evolution of medicine in the Far East. Hippocrates, considered the father of modern medicine, wrote approximately 400 herbal items.

Ebu Reyhan's book "Kitâbü's Saydana Fi't Tıb," which mentions roughly 20 medicinal plants and 800 animal and herbal therapies, was considered as a reference book until the 1650s. A copy of this book may be found in the Orhan Gazi Library. Ibn-i Sina and Al Gafini's book "Medicinel Law" has significant information on herbal medicine. In 1978, a German panel evaluated 300 plants for their clinical effects (Nathan et al., 1999; Izzo et al., 2005).

Natural goods and medicinal plants are now widely used for disease prevention and treatment. Herbal products are becoming increasingly popular due to their affordability and accessibility. However, the use of natural products is detrimental to nature. Consumption of natural products such as animal and herbal products, vitamins, minerals, and other substances has increased in recent years due to their safety (Friedman, 2000; Izzo et al., 2005). The World Health Organization reports that around 20,000 plant species are employed for both modern and traditional purposes. This figure excludes plant species commonly utilized in the cosmetic and botanical industries. In 2000, medical and aromatic plants had a market share of around \$60 billion. This statistic represents almost 20% of the global pharmaceutical market each year. International statistics indicate that the global market for medicinal herbal items and pharmaceuticals has reached. In 2015, the figure was 93 billion dollars, but in 2017, it was 107 billion. Despite the global economic slowdown, the market for herbal products and medicines has expanded dramatically in the previous decade. Despite Turkey's importance, global exports of medicinal and aromatic plants have not yet reached the anticipated level. In 2017, Turkey's medicinal and aromatic plant export business generated a total of 2.5 billion dollars, with 140 million dollars coming from the region. Turkey exports medicinal plants, ranking 18th out of 110 nations (Anonymous, 2018).

was *Carthamus tinctorius*, while another blend included *Paeonia lactiflora*.

In its Formula. Chinese herbs usually administered include *P. suffruticosa* (Mu Tan Pi) and *P. lactiflora* (Shuoh-Yaw). Jia-Wey--Shiau-Yau-San was a herbal concoction made from *Angelica sinensis* and *Atractylodes macrocephala*. The herbs *Paeonia lactiflora* and *Bupleurum chinense*, also known as *Poria Cocos*[4]

ITS USE IN PHYTOTHERAPY AND ITS CHEMICAL CONTENT –

-Paeonia flowers include anthocyanin colors (paeonin), flavonoids (chempferol derivatives), and tannins (gallottanene, found in leaves and roots). Folk medicine has traditionally used it to treat epilepsy, rheumatism, digestive issues (particularly seeds and roots), and coughing. It is used in homeopathy to treat cracks, hemorrhoids, and varicose veins. It is no longer in use today. It is occasionally added to tea blends to enhance the appearance of herbal teas. Excessive consumption of flowers, seeds, and roots might result in gastroenteritis, colitis, or diarrhea. Paeonia roots (*Radix paeoniae*) are used as an emmenagogue and emetic (Bisset, 1994).

-According to Baytop (1994), its roots act as a sedative. Experiments with mice revealed no anti-inflammatory impact.

-The roots of *P. officinalis* species *Radix paeoniae* contain paeonol, a heteroside with astringent and antispasmodic properties. It's utilized as an infusion sedative for epilepsy and pertussis (Tanker et al., 2007).

-Paeonia root is used in Eastern countries, particularly Egypt, to treat epilepsy by applying it to the patient's chest in the shape of a cross. This medication is known as "Cross of the Cross" in Egypt. Old literature suggest that using the plant's fruits to produce incense or hanging its root around the neck is useful. [5]

-The anti-inflammatory activity of *P. peregrina* and *P. daurica* species differed. While the methanol extract of *P. daurica* roots outperformed regular aspirin, no significant activity was found in *P. peregrina* roots. A study in Turkey found that the roots of *P. daurica* species have anti-inflammatory properties, making them a viable alternative to medicines (Yeşilada et al., 1989; 1992).

-According to Şener (1994), the roots of *P. daurica* species have antiinflammatory properties and can be utilized as an alternative to Moutan roots in traditional Chinese medicine.

-Orhan and Şener (2005) found anti-inflammatory properties in the roots of antispasmodic, epileptic, sedative, cough, whooping cough, and tuberculosis certain plants in Turkey found anti-inflammatory properties in the roots of *P. daurica* species.

-Paeonia lactiflora root extract at doses of 250 and 500 mg/kg inhibited reserpineinduced ptosis and hypothermia, while 125 mg/kg just inhibited hypothermia. This suggests that *P. lactiflora* is an antidepressant (Mao et al. 2008).

-A 4-year research of medicines used in Chinese herbal therapy for insomnia included 6860 patients and 37046 samples. The most commonly prescribed herb was *Carthamus tinctorius*, while another blend included *Paeonia lactiflora*.

-In its Formula. Chinese herbs usually administered include *P. suffruticosa* (Mu Tan Pi) and *P. lactiflora* (Shuoh-Yaw). Jia-Wey--Shiau-Yau-San was a herbal concoction made from *Angelica sinensis* and *Atractylodes macrocephala*. The herbs *Paeonia lactiflora* and *Bupleurum chinense*, also known as *Poria Cocos*, are commonly used to treat menopause symptoms. Chen et al. (2009) proposed a mixture to alleviate symptoms in women who may not use hormones or have contraindications after menopause.

-Mao et al. (2009) exposed mice to continuous unknown stress and studied the effect of

-Paeonia glycosides respond to this stress. The study found that Paeonia glycosides relieved depression in mice by inhibiting monoamine oxidases and reducing oxidative stress. Paeonia and the healer have a medical association, as proven. [6]

-Researchers discovered a molecule in Paeonia roots that was previously assumed to be an alkaloid but now behaves as a glycoside, producing paeonol and paeonine. This oil has limited application, even in Asian medicine. Western neuropathic and homeopathic practitioners typically employ flowers and seeds (Stearn et al., 1984; Halda et al., 2004).

-According to the book "Treatment with Plants in Turkey," peony roots have relaxing characteristics and can be used to treat epileptic seizures and coughs. According to Baytop (1999), the infusion contains tannin, essential oil, alkaloid, and paeonol. It is recommended to take 2-3 glasses daily.

-Ethnobotanical research in the Izmir region found that the roots of 14 *P. mascula* (L.) species were used as mouthwash for sore throats, antihemorrhagic, antispasmodic, epileptic, sedative, cough, whooping cough, and tuberculosis (Ugulu et al., 2009).

-A study in Adana and Mersin found that the flowers and roots of *P. mascula* (L.) Miller (Şakayık, ayıgülü, dede gülü) contain tannin and essential oils that have purgative, stomachic, collagog, and hepatoprotective properties. It is used to treat urinary system illnesses, jaundice, and as a hemagogue, either through douching or direct application. The *P. mascula* species, also known as 'ayıgülü' in

Kahramanmaraş, is used as a sedative, epilepsy and cough treatment, and respiratory regulator (Karaman et al., 2001; Everest and Öztürk, 2005).

-In a study conducted in Ovacık town of Tunceli Province, Turkey, Doğan (2008) found that the infusion prepared from the juvenile above-ground portions of *P. mascula* subsp. *arietina* consumed on An empty stomach can reduce blood sugar levels, and its young aboveground sections may aid in diabetes treatment. [7]

-In Turkey, *P. mascula* subsp. 'ayıgülü' is used as an infusion in sedatives, antitussives, and epilepsy treatments (Fakir et al., 2009).

-Ding et al. (2000) investigated the impact of chemical compounds extracted from Chinese *Paeonia suffruticosa* roots. The study found that they effectively prevent platelet aggregation, bleeding, and inflammation caused by bacterial infections. -In a study in Turkey, *Paeonia daurica* from Mesudiye village in Ordu province demonstrated antibacterial action against Gram-negative and Gram-positive bacteria, as well as mycobacterium Tosun et al. (2011) discuss fungus.

-Picerno et al. (2011) found that a methanol extract of dried *Paeonia rockii* roots had antifungal and free radical scavenging properties.

-According to a study by Melikoğlu et al. (2015), *Paeonia mascula* L. Miller subsp. *Arietina* (Anders) is utilized to cure asthma. [8]

-In Eastern Anotolia, decoctions of *Paeonia mascula* L. Miller subsp. *Arietina* (Anders) have been used to treat diabetes (Arituluk and Ezer, 2012).

-The ethanolic extract of *P. lactiflora* (Paeoniaceae) subtype has antiamnestic action and has been utilized in traditional treatments for amnesia. Sevim et al. conducted a study that validated this (2011).

-Previous investigations have shown that resveratrol and other stilbene compounds from *P. lactiflora* leaves have strong antioxidant action (Kim et al., 2002; Orhan et al., 2010).

-An in vitro study of *Paeonia lactiflora* root extracts in isolated rat aortas found that the main active components, Paeoniflorin and Paeonol, did not show vasodilatory effect. However, some components showed endothelium-dependent vasodilator activity (Goto, 1996). According to Koo (2010), the components of

P. lactiflora and *P. suffruticosa* prevent blood coagulation and platelet aggregation, leading to enhanced blood flow.

Paeonia lactiflora Pall has been used for 1200 years in traditional Korean, Japanese, and Chinese medicine. It treats fever, muscle cramps and spasms, rheumatoid arthritis, lupus, dysmenorrhea, and hepatitis. Pain alleviation has been shown in several animal models. In animal models of inflammation, it has been shown to lower intracellular calcium ion concentration and prevent the synthesis of nitric oxide, leukotriene B₄, and prostaglandins (He et al., 2011). A study by Bomi et al. (2008) shown that *P. lactiflora* can reduce itching and allergies in mice. [9]

Lee et al. (2006) studied the antiviral properties of a solvent derived from the roots of *P. lactiflora* Pall. in tissue culture systems. The ethylacetate fraction shown substantial anti-hepatitis B activity. Other fractions, however, did not inhibit HBV DNA. [10]

-Himalayan Peony (*Paeonia emodi* Royle) has traditionally been used to treat epilepsy (Miyazawa et al., 1984; Kirby and Schmidt, 1997; Verma et al., 2015). [11]

ADVANTAGES, PRECAUTION AND DISADVANTAGES OF PHYTOTHERAPY-

Phytotherapy is widely used in both traditional and modern medicine. Its advantages include the following:

Phytotherapy can prevent or treat various health conditions, including aging skin, acne, diabetes, high blood pressure, and cancer.

Plant extract medicines are generally safe and well-tolerated, with a favorable benefit-risk ratio. iii. Phytomedicines are cheaper than pharmaceuticals.

Phytotherapy is a resource for therapies. Modern medicine relies heavily on plant-based active compounds. Researchers are increasingly focusing on herbal medicine as a potential source of novel medications.

v. Effectively strengthens immune defenses for respiratory, rheumatic,

gastrointestinal, osteoarthritis, and urinary tract infections.

Herbal medicines can help boost immune defenses in patients with serious illnesses, including cancer (41).

VI. Areas.

In rural areas, phytotherapy can serve as a first-aid treatment.

Using phytomedicines requires taking certain precautions. Patients should focus on the following points.

In rare circumstances, harmful effects and combinations with other medications may occur. Contraindications must be considered.

Not all phytomedicines are acceptable for pregnant women.

During pregnancy, ask a doctor or pharmacist before taking any preparations.

There are no herbal remedies for certain conditions, such as AIDS, cancer, headaches, and miscarriages.

Drying plants can cause loss of essential oils and structural changes, which can negatively impact active principles and stability.

Allergy risks associated with phytomedicines due to their diverse content

TRADITIONAL USES -

1. Uterine disease: The fleshy roots of *Paeonia emodi* are used to treat uterine disease.
2. Nervous affection: The rhizome of *Paeonia emodi* is used as a nervine tonic to treat hysteria and abdominal spasms.
3. *Paeonia* is used to treat cardiovascular and respiratory disorders, including palpitations, high blood pressure, congestive heart failure, and atherosclerosis.
4. Menstrual disorders: *paeonia lactiflora*, or Bai Shao, is used to treat menstrual issues.
5. Inflammatory conditions: *Paeonia lactiflora* is used to treat inflammatory diseases.
6. Rheumatoid arthritis: TGP, a bioactive extract derived from *paeonia*, has been utilized to treat RA.

CONCLUSION-

The growing popularity of phytotherapy in Turkey and elsewhere has led to an increase in its economic value. Identifying plant species and exploring their potential for phytotherapy can benefit both health and the economy. This review highlights the economic ornamental potential of the peony plant, as well as its usage in phytotherapy. The plant is projected to become one of the most important plants in the future.

-Authors; contributions

-All authors contributed equally to the study.

-Statement of conflict of interest

-There is no conflict of interest between the authors

-Statement of research and publication ethics

-The author declares that this study complies with research and publication ethics.

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