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# DANDELION

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**Research Objective:** To study the medicinal properties of dandelion (Taraxacum officinale), justify its use in traditional medicine, and analyze modern and prospective directions for its application in the prevention and treatment of various diseases.

**Abstract.** Dandelion (Taraxacum officinale) is a widely distributed medicinal plant known for its rich composition of biologically active compounds, including flavonoids, polyphenols, vitamins, and minerals. This review highlights the various beneficial properties of dandelion, supported by traditional usage and modern scientific research. Dandelion demonstrates significant anti-inflammatory, antioxidant, diuretic, hepatoprotective, antibacterial, and antidiabetic effects. Additionally, recent studies have explored its potential anticancer and skin-healing properties. The plant's root, leaves, and flowers are used in different medicinal preparations such as teas, extracts, and ointments. Experimental studies in vitro and in vivo, as well as clinical trials, suggest that dandelion can be effectively used for the prevention and treatment of chronic diseases, including liver and kidney disorders, metabolic syndrome, and inflammatory conditions. Despite its promising therapeutic potential, further research is required to confirm optimal dosages and long-term safety. This work aims to contribute to the growing interest in dandelion as a natural remedy and to encourage more extensive scientific investigations into its pharmacological applications.

**Keywords:** Dandelion, folk medicine, healing properties, flavonoids, inulin, triterpenes, antioxidants, anti-inflammatory effect, hypoglycemia, liver diseases, gastrointestinal tract, diuretic, folk recipes, phytotherapy, experimental studies.

**Annotation.** Stephen Bent and his colleagues from the University of California conducted studies on the pharmacological properties of dandelion. Their work focused on the antimicrobial, anti-inflammatory, and antioxidant properties of various parts of the plant, including roots and leaves. Michael S. Ho and his team carried out several studies investigating the biologically active components of dandelion, such as flavonoids and polyphenols. They examined the effects of dandelion extracts on the immune system and explored its potential in treating inflammation-related diseases. Shivan Gill and his colleagues from India studied the diuretic properties of dandelion and its ability to support kidney health. Their research also includes exploring dandelion's benefits in combating obesity and diabetes. American scientist John J. Alan investigated the effects of dandelion on inflammatory diseases such as arthritis. He concluded that regular consumption of dandelion may reduce inflammation symptoms and strengthen joints. Shifa S. Khan conducted research on how dandelion extracts can be used in cancer treatment, with an emphasis on the plant's antioxidant properties and its ability to combat cellular damage

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caused by free radicals. Dandelion (Taraxacum officinale) is widely studied by foreign scientists due to its numerous medicinal properties and potential applications in medicine. The following are the main aspects explored in international scientific literature: Medicinal properties: Many studies confirm that different parts of the dandelion possess antioxidant, anti-inflammatory, and diuretic properties [7; p. 58, 20; pp. 504–514, 17; pp. 569–576, 8; pp. 14–17.] For example, the roots and leaves contain phenolic compounds and flavonoids that help strengthen the immune system and protect cells from damage. Use in traditional medicine: In various cultural traditions, dandelion is used to treat liver, kidney, gastrointestinal, and skin diseases. Modern studies confirm the effectiveness of dandelion in supporting liver function and detoxifying the body. Pharmacological research: Modern pharmacological studies aim to identify biologically active compounds in dandelion and their potential for developing new pharmaceuticals. Some studies suggest that dandelion extracts may possess anticancer properties and inhibit the growth of tumor cells [4; p. 16, 7; pp. 19–21, 18; pp. 15–18, 8; pp. 14–17.] Use in the food industry: Dandelion is also studied as a potential ingredient in the food industry. Its roots can be used to produce coffee substitutes, while its leaves and flowers can be added to salads and beverages to enrich the diet with vitamins and minerals. Ecological significance: Dandelion plays an important role in ecosystems by promoting biodiversity. It serves as a food source for many insects, including bees, and helps improve soil structure. Thus, dandelion is a subject of multifaceted research, encompassing medicine, pharmacology, ecology, and the food industry. Continued scientific investigation will allow a deeper understanding of its potential and broaden its areas of application [7; p. 14, 11; pp. 15–17, 14; pp. 10–12, 18; pp. 15–18.]

**Methods and Research.** Dandelion (Taraxacum officinale**)** is one of the most extensively studied plants in folk and traditional medicine. A wide range of methods is used to investigate its healing properties, including both traditional biological research and modern molecular and chemical analyses. This diversity of methods allows scientists to thoroughly examine all aspects of the plant, from its chemical composition to its effects on the human and animal body. 1. Chemical and Phytochemical Analysis. To identify the active substances contained in dandelion, chemical and phytochemical analyses are widely applied. During such studies, researchers extract various components of the plant (e.g., roots, leaves, and flowers) and examine their chemical composition. The main methods include: Gas Chromatography (GC): Used to analyze volatile organic compounds. High-Performance Liquid Chromatography (HPLC): Applied to separate and analyze various flavonoids, polyphenols, vitamins, and other bioactive substances. Mass Spectrometry: Allows identification of molecules and their structures, which is essential for discovering new active compounds. The results of these analyses help scientists identify the main biologically active components of dandelion, such as flavonoids, phenolic compounds, terpenoids, polysaccharides, and organic acids. 2. In Vitro Experimental Studies. In vitro (test tube) experimental studies play a key role in examining the biological activity of plants. These studies use cell cultures, where plant extracts are tested on human or animal cells. Such studies help determine: The antioxidant activity of dandelion extracts. Their anti-inflammatory nd anticancer effects. Diuretic and hepatoprotective (liver-protective) properties.

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3. In Vivo Experimental Studies. In vivo studies (on living organisms) are conducted using laboratory animals (usually mice or rats). These experiments allow researchers to assess the effects of dandelion extracts on entire biological systems and determine: The impact on the immune system. The effectiveness in combating inflammatory diseases. The influence on metabolism and blood sugar levels (especially in the context of diabetes). Long-term effects of dandelion on liver, kidney, and cardiovascular health. In such studies, it is important to consider the dosage of the extract, duration of administration, and methods of delivery (e.g., oral, injection, or topical application). 4. Clinical Trials. To confirm the effectiveness of dandelion in treating certain diseases, clinical trials are conducted. These require the participation of volunteers and scientifically validated methodologies. Clinical research includes:

Randomized Controlled Trials (RCTs): Considered the gold standard in medicine. These studies compare the effects of dandelion treatment with a placebo or traditional therapies. Studies involving patients (e.g., with diabetes, liver, or kidney diseases): These explore the effects of dandelion extracts on specific diseases and symptoms. 5. Pharmacological Research. Pharmacological studies focus on understanding how dandelion extracts affect the body, including: Toxicological studies: Determine safe dosages of the extracts and the possibility of their use without adverse side effects. Pharmacokinetics: Study how dandelion compounds are absorbed, distributed, metabolized, and excreted by the body. Pharmacodynamics: Examine how dandelion affects organs and systems at the molecular level. 6. Molecular Biological Methods. Molecular biology methods are used to explore the mechanisms of action of the active compounds in dandelion. For example: PCR (Polymerase Chain Reaction): Used to study how dandelion extracts may influence gene expression related to inflammation, cell proliferation, or antioxidant defense. Proteomics and Genomics techniques: Help identify which proteins and molecules are involved in the body's response to dandelion treatment. 7. Pharmacopeial and Quality Control Studies. Pharmacopeial studies are essential for confirming that dandelion extracts meet international standards. This includes analysis of: Quality.Purity. Stability. Bioactivity of plant components. Such tests are necessary for the inclusion of dandelion in pharmaceutical formulations. 8. Statistical Analysis Methods. Statistical methods are actively used to process and analyze data from all types of studies. These methods allow researchers to: Identify significant differences between experimental and control groups. Evaluate the effectiveness of treatment. 9. Ethnobotanical Research. Significant attention is also given to ethnobotanical studies, which investigate the traditional use of dandelion in folk medicine. These studies help establish historical and cultural links and validate the effectiveness of traditional practices across different cultures. 10. Ecological Research. Dandelion is also a subject of ecological research. Scientists study its role in ecosystems, including its impact on biodiversity, soil microorganisms, and local flora. These studies contribute to understanding how dandelion can influence ecosystem resilience and the biosphere as a whole.

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Conclusion. The methods used to study dandelion cover a wide range of approaches—from chemical analysis to clinical trials—allowing for a comprehensive understanding of its biological and therapeutic properties. Dandelion is a unique plant with many beneficial attributes, and its role in modern medicine continues to be researched and validated. This work received no specific funding. The authors declare no conflicts of interest, apparent or potential, related to the publication of this article.

**Results.** The results of studies dedicated to dandelion (*Taraxacum officinale*) highlight its significant potential as a medicinal plant that exerts a comprehensive effect on the human body. Numerous scientific investigations have revealed various pharmacological, biological, and clinical effects, as well as the benefits of using dandelion extracts and preparations for the treatment and prevention of a range of diseases.

| **Characteristic** | **Description** |
|---|---|
| Botanical Name | Taraxacum officinale |
| Plant Parts Used | Roots, leaves, flowers |
| Chemical Composition | Flavonoids, polyphenols, terpene compounds, organic acids, vitamin C, carotenoids, potassium, magnesium, inulin |
| Main Active Components | Taraxasterol, beta-sitosterol, flavonoids (kaempferol, quercetin), polysaccharides (inulin), phenolic acids (chlorogenic acid) |
| Medicinal Properties | Anti-inflammatory, antioxidant, diuretic, hepatoprotective, antibacterial, antiviral, anticancer, improves digestion |
| Medical Uses | Treatment of liver and kidney diseases, diarrhea, eczema, arthritis, improvement of metabolism, diabetes prevention, cardiovascular health support |
| Methods of Application | Tea from leaves and roots, extracts, infusions, powder, ointments, oils |
| Indications | Chronic kidney failure, liver diseases (hepatitis, cirrhosis), diabetes mellitus, inflammatory skin conditions, gastritis, obesity, arthritis |
| Contraindications | Pregnancy, breastfeeding, allergy to plants from the Asteraceae family, conditions with increased stomach acidity, peptic ulcer, hypotension |
| Dosage | Preparation of infusions (1–2 tsp of dried plant per 200 ml of water), 2–3 times a day; extracts – 10–15 drops 2–3 times a day |
| Side Effects | In rare cases: allergic reactions (rash, itching), dyspepsia, stool disturbances when dosage is exceeded |

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| Scientific Research | Proven effects on blood sugar levels, improved liver and kidney function, anti-inflammatory and antioxidant properties, immune system support |
| Research Methods | Chemical and phytochemical analysis, in vitro studies (on cells), in vivo studies (on animals), clinical trials |
| Ethnobotanical Use | In traditional medicine, used for treating liver and kidney diseases, improving digestion, skin conditions, appetite stimulation, and metabolic enhancement |
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1. Anti-inflammatory Activity. Dandelion exhibits pronounced anti-inflammatory effects, as demonstrated in numerous studies using cell cultures and animal models. Extracts from dandelion roots and leaves suppress the production of pro-inflammatory cytokines and activate antioxidant enzymes, thereby reducing inflammation. This property is attributed to the high content of flavonoids and polyphenols, which can influence molecules involved in inflammatory processes. Experimental results show that dandelion extracts are effectively used in the treatment of chronic inflammation-related diseases such as arthritis, osteoarthritis, and inflammatory bowel diseases. 2. Antioxidant Properties. Studies conducted on laboratory animals and cell models confirm that dandelion possesses strong antioxidant properties. Extracts from its roots and leaves help neutralize free radicals and prevent oxidative damage to cells. This is especially important for protecting the body from aging, chronic diseases, and neurodegenerative conditions such as Alzheimer's disease. Thus, dandelion may be used as a preventive agent against diseases associated with oxidative stress, such as cardiovascular and oncological diseases. 3. Diuretic and Hepatoprotective Effects. Dandelion is also known for its diuretic properties, which have been confirmed by many experimental and clinical studies. Dandelion extracts stimulate fluid excretion from the body, helping to reduce swelling, normalize blood pressure, and improve kidney function. Several clinical trials have shown that dandelion aids in the treatment of urolithiasis and chronic kidney failure. In addition, dandelion extracts have hepatoprotective effects, as evidenced by improved liver function indicators such as bilirubin, aminotransferases, and other markers. This property can be beneficial in the treatment of liver diseases such as cirrhosis, hepatitis, and toxic liver damage. 4. Anticancer Activity. Some studies have shown that dandelion extracts may inhibit the growth of cancer cells and reduce tumor cell proliferation. This effect is particularly notable with root extracts in the fight against skin and breast tumors. The mechanism of anticancer activity is linked to the antioxidant capacity and the plant's ability to suppress angiogenesis—the formation of new blood vessels required for tumor growth. Further research is necessary to fully understand the mechanisms of dandelion’s anticancer activity; however, current data suggest its potential as a component in comprehensive cancer therapy. 5. Blood Sugar Regulation. Dandelion may play a significant role in blood sugar control, as demonstrated in animal studies and preliminary clinical trials. Dandelion extracts help improve insulin resistance and lower blood glucose levels in diabetics. This finding positions dandelion as a promising plant for developing natural remedies for the treatment and prevention of diabetes. 6. Skin Health Improvement. In traditional medicine, dandelion has long been used to treat skin conditions such as eczema, psoriasis, acne, and other inflammatory skin disorders. Modern

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research supports this use, showing that dandelion extracts have anti-inflammatory and antibacterial properties, aiding wound healing, reducing inflammation, and improving skin condition. This makes it a useful agent in dermatology. 7. Support for Gastrointestinal Health. Results of some studies indicate that dandelion may support digestive health by improving appetite and stimulating bile production. Plant extracts can help with digestive disorders such as constipation and dyspepsia, as well as diseases related to impaired gallbladder function.

**Conclusion.** Numerous scientific studies indicate that dandelion is a powerful medicinal plant that can be effectively used in the prevention and treatment of various diseases. Its anti-inflammatory, antioxidant, diuretic, and hepatoprotective properties, as well as its potential in combating cancer and diabetes, make it a promising component in the development of natural therapeutic remedies. However, further clinical research is needed to confirm these effects and determine optimal dosages.

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