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Uses of Plant Derivatives with Potential Beneficial Effects on Human Health: A Biological Perspective

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Abstract

The present article summarizes the most common uses of plant derivatives with potential beneficial effects on human health from a biological perspective. In particular, we refer to the following plant species : *Eucalyptus globulus*, *Matricaria recutita* (Chamomillae), *Olea Europaea-Oleum Olivarum*, Aloe Vera, *Valeriana officinalis*, *Ginkgo bilobae*, *Echinacea purpurea*, *Calendula officinalis - Calendula arvensis*, *Cassia angustifolia-Cassia acutifolia* (Senna), *Allium sativum (Garlic)*, *Panax ginseng*, *Hypericum perforatum* (Saint John's wort). Various beneficial biological actions are reported in the literature such as: antioxidant, antimicrobial, anti-inflammatory, anticarcinogenic, hypoglycemic, neuroprotective, skin-protective, wound-healing, hypnotic, etc. However, attention should be paid to some important points, such as the fact that chemical compounds of plant derivatives can interact with conventional medicines, the recommended dosage should never be exceeded, there are several toxicity and adverse clinical effects, and an individual must always seek guidance from trained and licensed health professionals. Further studies (in vitro, in vivo, and controlled human/clinical trials) are needed to clarify the potential beneficial effects of plant derivatives on health, the optimal dosage, the dose-response characteristics, the interactions with drugs, the bioavailability, the long-term effects, and their safety.

Keywords: Plants; Humans; Health; Biological activities; Health benefits

Introduction

Pharmacy (pharmacognosy and chemistry of natural products), botany (plant science), phytochemistry and food science are various fields of science that jointly examine the effect of plant derivatives on human health. These studies are carried out in solutions, cells, tissues, experimental animals and -at the final stage- in humans (clinical studies). They are very important because their results are of practical importance in everyday life, as they can contribute to maintaining and improving health, well-being and wellness [1]. The present article summarizes the most common uses of plant derivatives with potential beneficial effects on human health from a biological perspective. In particular, we refer to the following plant species: *Eucalyptus globulus*, *Matricaria recutita* (Chamomillae), *Olea Europaea-Oleum Olivarum*, Aloe Vera, *Valeriana officinalis*, *Ginkgo bilobae*, *Echinacea purpurea*, *Calendula officinalis - Calendula arvensis*, *Cassia angustifolia-Cassia acutifolia* (Senna), *Allium sativum* (Garlic), *Panax ginseng*, *Hypericum perforatum* (Saint John's wort).

Uses of plant derivatives with potential beneficial effects on human health

Eucalyptus globulus is a plant belonging to the family Myrtaceae. Eucalyptus is extensively planted for pulp, plywood and solid wood production, but its leaf aromatic oil has astounding widespread biological activities, including healing, and insecticidal/insect repellent, herbicidal, acaricidal, nematicidal, and perfumes, soap making and grease remover [1]. *Matricaria recutita* is a plant belonging to the family Compositae (Asteraceae). It is commonly used for its antioxidant, antimicrobial, antidepressant, anti-inflammatory, antidiarrheal activities, angiogenesis activity, anticarcinogenic, hepatoprotective, and antidiabetic effects. Besides, it is beneficial for knee osteoarthritis, ulcerative colitis, premenstrual syndrome, and gastrointestinal disorders [2]. The olive tree, *Olea Europaea*, of the Oleaceae family, is a tree native to the Eastern Mediterranean, but today it is cultivated in all Mediterranean countries as well as in the USA and in Argentina. From the ripe fruits of the plant, we get olive oil (*oleum olivarum*). The Olea europaea extracts from leaves and fruits are widely used in contrasting and preventing various pathologies. Plant extracts exhibit cholesterol-lowering, hypoglycemic, antibacterial, neuroprotective, antioxidant, anti-inflammatory and hypotensive activities [3]. The Aloe Vera plant (*Aloe barbadensis*) belongs to the Aloe genus of the Liliaceae family. Various biological and pharmacological activities of Aloe vera, such as antioxidant, anti-inflammatory, immuno-modulatory, antimicrobial, antiviral, antidiabetic, hepatoprotective, anticancer, and skin-protective and wound-healing responses, have been reported [4]. *Valeriana officinalis* is a plant belonging to the family Valerianaceae. Valeriana improves subjective experiences of sleep when taken nightly over one- to two-week periods, and it appears to be a safe sedative/hypnotic choice in patients with mild to moderate insomnia. It is also used in patients with mild anxiety [5]. *Ginkgo bilobae* is a plant belonging to the family Ginkgoaceae.

It presents antioxidant, anticancer, antiviral, antibacterial, antifungal and anti-inflammatory activities, and it has a potential role in the treatment of cardiovascular, metabolic and neurodegenerative diseases [6]. *Echinacea purpurea* is a plant belonging to the family Compositae (Asteraceae). Properties of *Echinacea purpurea* are immunomodulating and anti-inflammatory effects, antiosteoporotic activity, antioxidant activity, and antimicrobial effects [7]. *Calendula officinalis* and *Calendula arvensis* are plants belonging to the family Compositae (Asteraceae). *Calendula officinalis* presents multifaceted biological effects such as anti-inflammatory, anti-cancer, antihelminthic, antidiabetes, wound healing, hepatoprotective, and antioxidant activities. Additionally, it is employed in cases of certain burns and gastrointestinal, gynecological, ocular, and skin conditions [8]. *Calendula arvensis* shows a wide range of bioactivities, namely, anti-inflammatory, antimicrobial, antitrypanosomial, antitumoral, antimutagenic, and immunomodulatory activities, as well as wound treatment [9]. *Cassia angustifolia* and *Cassia acutifolia* are plants belonging to the family Leguminosae (Caesalpiniaceae, Fabaceae). Senna consists of the dried leaflets or fruits of *Cassia acutifolia* (*Cassia senna*) known in commerce as Alexandrian senna and of *Cassia angustifolia* commonly known as Tinnevelly senna. Senna plants indicate in viro antioxidant, antibacterial, antifungal, antiviral, and antiprotozoal activities, while clinical studies show efficacy in treating constipation [10]. *Allium sativum* is a plant belonging to the family Liliaceae. From garlic we get the bulb (Bulbus allii sativi). Substantial studies have shown that garlic and its bioactive constituents exhibit antioxidant, anti-inflammatory, antibacterial, antifungal, immunomodulatory, cardiovascular protective, anticancer, hepatoprotective, digestive system protective, anti-diabetic, anti-obesity, neuroprotective, and renal protective properties [11]. *Panax ginseng* is a plant belonging to the family Araliaceae. It has a variety of beneficial effects, including anti-inflammatory, antioxidant, and anticancer effects. Results of clinical research studies demonstrate that *Panax ginseng* may improve psychologic function, immune function, and conditions associated with diabetes [12]. *Hypericum perforatum* (Saint John's wort) is a plant belonging to the family Hypericaceae. The biological effects of Hypericum perforatum include antidepressant and analgesic effects [13]. Moreover, Hypericum essential oils have been investigated for a wide range of biological activities: in vitro antimicrobial, antiangiogenetic, antioxidant, antiviral, antimalarial, cytotoxic, neuroprotective, tyrosinase inhibitory, and immunomodulatory activities, as well as in vivo experiments for anti-angiogenic, hepatoprotective, and wound-healing effects [14].

Conclusions

Various beneficial biological actions are reported in the literature such as: antioxidant, antimicrobial, anti-inflammatory, anticarcinogenic, hypoglycemic, neuroprotective, skin-protective, wound-healing, hypnotic, etc. However, attention should be paid to some important points, such as the fact that chemical compounds of plant derivatives can interact with conventional medicines, the recommended dosage should never be exceeded, there are several toxicity and adverse clinical effects, and an individual must always seek guidance from trained and licensed health professionals. Further studies (in vitro, in vivo, and controlled human/clinical trials) are needed to clarify the potential beneficial effects of plant derivatives on health, the optimal dosage, the dose-response characteristics, the interactions with drugs, the bioavailability, the long-term effects, and their safety.

Conflict of Interests

The author declares that he has no conflict of interests. The appearance of plant derivatives references in the publication is not an approval of the plant derivatives or their effectiveness, quality or safety.

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