

Echinacea purpurea, a pathway to increased immunity

Abstract

This work aims to return scientific interest to the valuable biochemical components found in Phytotherapy in times of exponential growth of viral propagation in the world. The topic addressed will be specifically the Echinacea Purpúrea plant, a member of the *Compositae* or *Asteraceae* family, which has been researched all over the world, may open up new possibilities for the treatment of oral and systemic diseases, using its own biochemistry as a stimulating factor to increase immunity. Recent studies in humans have shown actions of interest in the immune response with its use, both in aerial part and roots.

Keywords: immunity, *Echinacea purpurea*, cold, health, viral infection

Volume 8 Issue 1 - 2023

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Received: August 16, 2023 | **Published:** September 04, 2023

Synonyms

Cone-flower, Hedgehog, Indian head, Kansas snakeroot, Missouri snakeroot, Purple coneflower, Red sunflower, Rudbeckia, Sampson root, Scurvy root, Snakeroot. The term echinacea comes from the Greek echinos and means sea urchin in allusion to the pointed shape of the bract.

Historic

Echinacea is a native American plant and one of the best known herbal medicines used in Europe and the United States to prevent flu and colds. Its flowers are intensely purple and grow around a tall cone and have a light scent. The root is tapered, cylinder-shaped and slightly spiraled. It became known to European botanists in 1690. It is the most researched immunostimulant plant in the world, especially in Europe. Highly priced by natural health advocates for its immune-boosting properties, it also supports the respiratory system.

The first illustration of the Echinacea plant was found in the third volume of the manuscripts of Professor R. Morison (first Professor of Botany at Oxford), dated 1699. The professor first named this species *Dracunculus virginianus Latifolius*, later in the 18th century it was named *Rudbeckia Purpúrea* until it received the name *Echinacea Purpúrea*.

This plant was first used by North American Indians to cure wounds, toothache and fever (it has anti-inflammatory, antibacterial, antiviral properties and is vulnerable), as it was born abundantly in the mountains of the north of the United States. They called it *ek-ih-nay-see-uh*, to treat or prevent infectious diseases and tumors and neutralize the toxic effects of bites from snakes or poisonous animals. The Sioux Indians were the first to recognize *Echinacea* as an antidote for rabies, long before Pasteur. Mesk natives Wakis used the grated root as an antispasmodic and the Cheyennes chewed it as part of the Sun Dance ritual. In indigenous cultures and early American settlers, the plant was smoked to combat cephalalgias (headaches), with its smoke blown into the nostrils of enraged horses in order to calm them down.

The sorcerers and witchdoctors washed their hands with Echinacea juice before plunging them into boiling water. Indians of the Winnebago tribe used *Echinacea* before placing a burning coal in the mouth. The chewed root was also used for toothaches, enlarged ganglia, as in mumps, and its juice was applied on burns and wounds.¹

White settlers later adapted the plant for their use.

Only in 1870, the product coming from the Midwest of the United States was patented and thus *Rudbeckia Roxa* was prepared for medical use. This plant was named *Echinacea Purpúrea* and is very effective in the treatment of cold sores, rheumatism and erysipelas. In 1890, Lloyd Brothers became the first North American company to export *Echinacea* to the European market. At the end of that century, the North American Pharmacopoeia considered the tincture of *Echinacea* an immunomodulator.

At the beginning of the century it was brought to Europe, having in the thirties the great discovery of the German company Madaus and Co, which initiated research that is carried out until today, mainly by Dr Wagner in Munich. Germany commercializes drugs with the active principle of *Echinacea Purpúrea* on a large scale. Currently, in the middle of the 21st century, scientific research continues and turns to preventive and therapeutic use, both anti-inflammatory and action anti-viral activating immune system.

Active principles

The aerial parts of *Echinacea Purpúrea* are used as a vegetable drug (flowers, leaves and seeds collected at the time of flowering) as well as its fresh or dried roots, collected in autumn. Its wide range of activities in terms of immunity has already been confirmed in numerous scientific studies. Echinacea acts as an immunostimulant by several mechanisms: stimulation of phagocytosis, stimulation of cytokine release and inhibition of hyaluronidase activity. Studies have shown that a principle of Echinacea, heteroxylan activates phagocytosis, and another arabinogalactan causes proliferation of T lymphocytes and promotes the release of tumor necrosis factor (TNF), interleukin 1 and interferon- β 2 from macrophages, increasing the overall level of the body's resistance to infection, acting as an immunostimulant.²

In its biochemical composition we find:

- Caffeic acid derivatives (phagocytic properties), mucopolysaccharides
- Essential oils in the aerial part: Pyrrolizidine alkaloids: tussilagin and isotussilagin.
- Alkamides (anti-inflammatory properties),
- Polysaccharides inulin, betaine (hyaluronidase inhibitors),
- Glycoproteins (B and T cell stimulators).
- Phenylcarbonic acid glycosides: echinacein, cynarin and echinacoside.

- Resins containing fatty acids (oleic, linolenic, cerotinic and palmitic) and phytosterols.
- Minerals: zinc and sulfur.
- Equinolone, chicoric acid (found in leaves and roots), triterpenes.
- Organic acids: chlorogenic and isochlorogenic
- Flavonoids, tannins, vitamins (thiamine and riboflavin).

It probably develops bacteriostatic action through inhibition of bacterial hyaluronidase. This effect helps prevent infections when used on wounds. In addition to this hyaluronidase -inhibitory effect, it has fungicidal properties by stimulating the growth of new tissue.

Echinacea stimulates the production of leukocytes, acts as a natural antibiotic, accelerates the body's rehabilitation, has an anti-inflammatory effect; fight viruses.

Currently, *Echinacea Purpurea* has been used for the treatment of flu and colds (both in prevention and in some therapeutic applications), patients undergoing chemotherapy, prevention of infections and temporary illnesses, abscesses, bronchitis, sore throat, allergic reactions, mitigating arthritis rheumatoid arthritis and, more recently, for labial herpes.

Other diseases can also be cited where its effectiveness has already been proven: pneumonia and respiratory diseases in general.

Literature review

The first reports of experimental research, with the purpose of looking for significant levels of toxicity, are from 1976, rats were inoculated with *Echinacea Purpurea* and no significant signs were found. This low level of toxicity has been researched over the years and the presence of several polysaccharides has been confirmed, demonstrating its low toxicity. Studies in mice have shown that this plant can increase the production of stimulating substances, such as interleukins and tumor necrosis factors.³

Chicoric acid from *Echinacea Purpurea* flowers helps to stimulate macrophages and leukocytes, observed *in vitro* by DF. Brown in 1996.⁴ Although not all studies have given positive results, there is considerable evidence that *Echinacea Purpurea* can boost immunity. We have as an example a research with flu patients, who took larger doses of *Echinacea Purpurea*, where it was observed that they recovered faster than those who took smaller doses or placebo; in another research, the administration of polysaccharides from *Echinacea Purpurea* increased the interferon level, managing to significantly reduce cases of psoriasis.⁵ However, it was in 1985 that the first studies of the immune system in human beings began with the use of *Echinacea*, obtaining such favorable results that the European scientific community was really surprised, because it was possible to stimulate the immune system in humans, obtaining if results between 40% and 50% of stimulation in the stem cells of the bone marrow and lymphatic system), thus increasing the B and T cells. The results began to be observed in colds and flu and even infections caused by *Candida Albicans*.

Phytosterols participate in the anti-inflammation mechanism and *Echinacea Purpurea*, because it has these natural anti-inflammatories, does not cause an exaggerated immune reaction, such as autoimmunity.⁴

Currently, research has been carried out on its use as a topical medication for cold sores, with great success. After application to the site of injury, it relieves symptoms such as pain, burning, itching, burning and numbness in the lip. This result is due to the intracellular

response to the virus, as Echinacea increases the production of interferon (these results had already been found by Dr Wagner in 1985).⁶ The intracellular mechanism breaks the DNA chains of the virus, blocking its reproduction. Cytochromo P 450 seems to be the main system responsible for the metabolism of *Echinacea components*: most of the main hepatic and some extra-hepatic isoforms seem to be involved.⁷ The acids present in the roots have shown hepatoprotective effects.⁸ The most abundant alkyl (alkamide) in *Echinacea Purpurea* was successfully quantified in the plasma of patients after ingestion of the extract by the LC-MS/MS assay.⁹ Recent studies have investigated the possible toxicity of its use and it has low rates. Concomitant use with warfarin (anticoagulant) seems to have its kinetics altered with a certain increase in serum levels, however without interfering with its pharmacological activity¹⁰ do not use it in conjunction with immunosuppressive drugs, or in progressive systemic diseases such as tuberculosis and, in general, in autoimmune diseases.

The European Medicines Agency (EMA)¹¹ indicates the use of the root, solely based on its traditional use, in the treatment of symptoms of the common cold and for blemishes or scars due to mild acne. However, the flowering aerial part of this species is indicated, in well-established use, for the prevention and short-term treatment of the common cold, and in traditional use, in small superficial wounds. Recent studies have shown actions of interest in the immune response with the use of *Echinacea Purpurea* are immunosuppressive in nature rather than immunostimulant ascribed to the inhibitory actions on the release of various cytokines.¹² A novel homogeneous polysaccharide from *E. purpurea* (EPPA) is under study and its oral use could be a strategy to tackle tumors by tailoring M1 macrophage function.¹³ Patients with Recurrent Herpes Labialis were studied and used a liquid form administered 3x to the subjects participating in the study and the response of Tregs cells immunosuppressants (CD4 +CD25+) decreased significantly, giving rise to lymphocyte redistribution.¹⁴ A recent review cross-referencing information on preventive use and as an antiviral agent for the treatment of respiratory diseases caused by some already known variants of Sars Cov II, concluded that although more studies need to be carried out, it can be said that the preventive action in children up to 12 years old proved to be very effective.¹⁵

Conclusion

The objective of this review is to briefly inform some of the many studies that began *in vitro*, with animals and in humans and have been widely developed with positive scientific evidence, and to highlight the pharmacological properties of this plant drug. Of course, it is observed that *Echinacea Purpurea* does not exactly represent the solution for better immunity, but it is quite clear that its effects are quite interesting in this sense, taking into account its few if very well defined restrictions.

It should be noted that, in addition to proven effective anti-inflammatory properties, inhibition of bacterial hyaluronidase and stimulation of B and T cells are bacteriostatic and antiviral factors that should be considered. And today, in an era of new scientific guidelines, all scientific knowledge that can be applied in order to stimulate the immune system comes to add positively in this fight that humanity faces against intelligent viral agents that place the most modern vaccine concepts still short of a full immunity coverage of our patients.

Acknowledgments

My thanks to editors and reviewers of JSRT MedCrave.

Conflicts of interest

Author have no conflict of interest.

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