NEW INSIGHTS ABOUT MEDICINAL USES AND HEALTH-BENEFICIAL PROPERTIES OF CACTUS PRODUCTS

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Códice Florentino, 1575
TRADITIONAL USES

The origin and history of cacti are closely related to the ancient Mesoamerican civilizations.

For over 12,000 years, fresh nopal cactus has been consumed by the natives for its nutritional qualities and healing properties.
MEDICINAL PROPERTIES OF CACTUS PRODUCTS

- Traditional and popular uses
- Latest advances in scientific studies concerning medicinal properties
- Functional foods and nutraceutical products available in the market
Plants and herbs have been used by ancient civilizations to cure diseases and heal wounds for thousands of years.
Although, cacti are native to America, they are now, wild or cultivated, widely spread in Africa, Asia, Europe and Oceania.

Cactus cladodes, fruits, seeds and flowers have been used as folk medicines in several countries for centuries.
The use of cactus flower petals to treat urological problems is well-known in Sicily.

Kidney colic treatment with *Opuntia ficus-indica* flowers was already mentioned by Pitrè (1896).

They are also recognized the properties of the infusions of dried flowers to prevent prostate cancer.

- Depurative and diuretic effects
- Renal calculus expulsion
TrAditionAl USeS

Cladodes are used in folk medicine for the treatment of gastric ulcer and for their healing activity as therapeutic agent.

- Emollient and Moisturizing effects
- Cicatrizant properties
- Hypoglycemic action
- Gastritis relief
FOLK MEDICINAL USES

FRUITS AND JUICES

- Diuretic effect
- Hypoglycemic agent
- Hypocholesterolemic factor
- Anti-allergic activity
- Analgesic and anti-inflammatory actions
- Used to treat indigestion
- Used to alleviate alcohol hangover symptoms
These popular uses, whose safety and effectiveness have been tested and verified over centuries only with the empirical evidence, need to be validated with scientific studies.

This will allow to find new applications and discover more effective formulations.
SCIENTIFIC INVESTIGATIONS

BIOACTIVE CONSTITUENTS

IN VITRO AND IN VIVO ACTIVITIES
CACTUS FRUITS

- BETALAINS
- POLYPHENOLS
- VITAMIN C
CACTUS FRUITS PIGMENTS

BETAXANTHYNS

Indicaxanthin

BETACYANINS

Betanin, isobetanin
PADS OR CLADOODES

- **DIETARY FIBRE** (43 % d.w.)
- **MUCILAGE** (18 % d.w.)
- **PECTINS**
- **MINERALS**: Ca$^{2+}$, K$^+$
FRUIT SEED OIL

RICH IN POLYUNSATURATED LIPIDS
PUFA 70% (Linoleic acid 60%)

OTHER CONSTITUENTS AS PHYTOSTEROLS

- Columnar cactus seed oil
LA: 50%
OA: 36%

- Pitayas (Hylocereus spp.)
Tocopherols and polyphenols

Seed endosperm consists of arabinan-rich polysaccharides
FLAVONOIDS
Quercetin, isorhamnetin and kaempherol glycosides

BETALAINS
betanin, phyllocactin (6′-O-malonylbetanin)
SCIENTIFIC INVESTIGATIONS

BIOACTIVE CONSTITUENTS

IN VITRO AND IN VIVO ACTIVITIES
Free Radicals have been related to serious diseases
- Cancer
- Alzheimer's and Parkinson's Diseases
- Heart Conditions
- Cataracts
- Atherosclerosis
ANTIOXIDANTS

DELAY, INHIBIT, OR PREVENT OXIDATIVE DAMAGE

BETALAINS
CAROTENOIDS
VITAMIN C
POLYPHENOLS
CARMINIC ACID
ANTIOXIDANT ACTIVITY

In vitro assays

The extracts of fruits and cladodes of different cactus species have been assayed in vitro by numerous research groups during last 15 years.

- Antiradical activities against DPPH• and ABTS•⁺ radicals
- Oxygen Radical Absorbance Capacity (ORAC)
- Protective ability towards lipid oxidation thermically induced in oils and emulsion models
**In vivo assays**

The effectiveness *in vivo* of an antioxidant depends on diverse factors as its bioavailability, the action site, the type of reactive species with which it will react and the possible synergistic effects with other compounds present in the food matrix.
Effect on the oxidative stress in humans

Betalains
↓ oxidative stress markers
↓ LDL oxidation
↓ oxidative hemolysis red blood cells (ex vivo)

-Livrea and coworkers
**NEUROPROTECTIVE ACTION**
against neuronal oxidative injuries

*O. ficus indica* flavonoids and extracts were found to be effective in cultured mouse cortical cells and against global ischemia in gerbils. Kim et al. (2006)

**PROTECTIVE EFFECT**
against Ni-induced toxicity

*Opuntia ficus indica* cladode juice prevents oxidative stress and decreased the related parameters in rats. Hfaiedh et al. (2008)
Zou and co. tested the ability of cactus pear fruit extract in suppressing carcinogenesis in cultured human cancer cell lines in vitro and an animal model in vivo.

Their results showed that the cactus extract inhibited the growth in vitro of ovarian, bladder, and cervical cancer cells and suppressed tumor growth in animal inoculated with ovarian cancer cells.

Cactus pear extracts could be a candidate in cancer prevention for both normal and high-risk populations and prevention of recurrence in patients with previous cancers.

A cladode extract from *Opuntia streptacantha* was reported to exhibit antiviral properties towards DNA viruses, such as herpes, and RNA viruses, such as influenza type A and human immunodeficiency virus HIV-1.

The active principle was located in the outer noncuticular tissue and ascribed to a protein with unknown mechanisms of action (Ahmad *et al.*, 1996). Replication of both DNA and RNA viruses was inhibited.

OTHER MEDICINAL PROPERTIES CONFIRMED BY SCIENTIFIC RESEARCH

- Anti-inflammatory and analgesic properties
- Antiulcerogenic effects and healing properties
- Anti-hyperlipidemic effect and cholesterol reducing levels
- Diuretic effect
INDUSTRIAL DEVELOPMENTS

PERSPECTIVES?
HIGH VALUE-ADDED PRODUCTS

- NUTRACEUTICAL PRODUCTS,
- FUNCTIONAL FOODS
- COSMETICS

CURRENTLY AVAILABLE IN THE MARKET
Nopal powder

Dehydrated Nopal
Nopal pills and capsules
FUNCTIONAL FOODS

Nopaltilla (TM) The Healthy Green Cactus Tortilla

Nopaltilla Converts Your Regular Taco To a Healthier More Nutritious Lower Calorie Meal

Tortilla made Of Prickly Pear Cactus
FUNCTIONAL FOODS

Prickly Pear Cactus Candy

Hangover Terminator

Prickly Pear Fruit Spread

JAM & JELLYS
FUNCTIONAL FOODS

Cactus pear juice

Cahill Prickly Pear Thirst Quencher
Rich in Vitamin C, Flavonoids & Antioxidants
100% Natural

- Protect against premature aging
- Reduce inflammation
- Promote optimal cellular health
- Detoxify the body

Sonoran Bloom - The Power of Nopal Cactus
COSMETICS
SEED OIL

Cactus seed oil 100 %
organic from morocco

anti-wrinkle cactus seeds oil
Thank you for your kind attention.