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In Brief

ANTHRAQUINONES-A Naturopathic Compound

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Abstract

Anthraquinones are potent aromatic compounds that, besides being used commercially, offer numerous therapeutic benefits such as inhibiting cancer growth by inducing apoptosis, relieving constipation, ease bowl movement etc. Anthraquinones are found naturally in some plants such as senna, buckthorn, yellow dock etc while they can also be produced using chemical routes such as anthracene oxidation, naphthalene oxidation, condensation of 1, 4-naphthoquinone with butadiene etc. However its intake should strictly be regulated since it may cause some serious side effects.

Keywords:
Bianthrones; Buckthorn; Cascara sagrada; Anthracene; Peristalsis; Laxative

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Introduction

Anthraquinones are aromatic carbon-based complexes that are present in few herbs and edible plants either as anthrones or bianthrones [1]. Anthraquinones and their derivatives are widely used in vat pigments/dyes, as additives in the paper and pulp industry, in seed treatment method, as pesticides, in the production of hydrogen peroxide etc [2]. In addition anthraquinones also contain healing and anticancerous properties [3] (Figure 1).

Enlisted Below are some Plants that are Enriched with Anthraquinones

- Aloe (Aloe barbadensis)
- Buckthorn
- Senna (Cassia sp)
- Yellow dock (Rumex crispus)
- Rhubarb (Rheum palmatum)
- Cascara sagrada (Rhamnus frangula) [4], [5].

Chemical Based Production of Anthraquinones

Several methods for the synthesis of anthraquinones are employed such as

- Anthracene oxidation with concentrated nitric acid [6].
- Chemical preparation of anthraquinones from benzene and phthalic anhydride [7].
- Naphthalene oxidation with butadiene followed by dehydrogenation to obtain the desired anthraquinones [8].
- Dimerization of styrene with phosphoric acid followed by vapor phase oxidation [9].
- Anthracene oxidation either with chromic acid in sulfuric acid (48%) or oxidation with air [10].
- Condensation of 1, 4-naphthoquinone with butadiene [11].

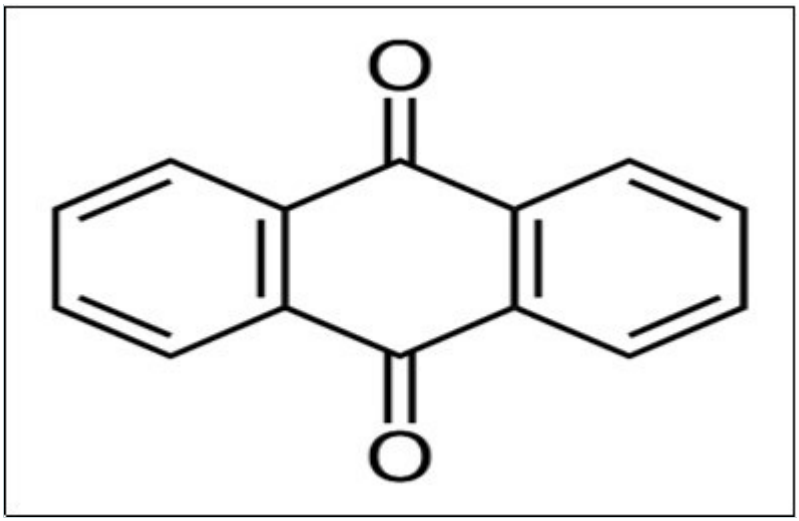


Figure 1. Chemical structure of Anthraquinone

Anthraquinones are listed as one of the mostly consumed chemical in the United States which produces approximately 5000–25 000 tons of anthraquinones annually [12].

Medicinal Properties of Anthraquinones

Anthraquinones possess antiviral, antifungal, antibacterial, laxative, insecticidal and antioxidant properties which make them suitable to be used in the treatment of various ailments [13], [14].

Health Benefits of Anthraquinones

Anthraquinones are used for the treatment of various medical conditions which are as follows:

Treatment of Constipation

Because of their laxative property, anthraquinones elevate the concentration of fluid in the large intestine and excites colon peristalsis thus allowing easy bowel movements. [15]. Additionally increased osmotic secretion of chloride ions into the gut lumen results in succeeding excretion of water [16].

Treatment of Cancer

Anthraquinones inhibit the growth of cancerous cells by inducing apoptosis in HER2 breast cancer [17] and in mercury induced kidney cancers [18]. They also impose cytotoxic activities on EOL-1 cell lines, leukemic 1301 and T cell lines [19].

Side Effects of Anthraquinones

Long term use of anthraquinones might have notable side effects, some of which are as follows:

• Development of Melanesia coli, a condition in which the colon lining takes on a dark brownish black hue increasing the risk for cancer [20].

• Anthraquinone dependency is developed in individuals who have been using it as a laxative over prolonged periods [21].

• Overconsumption of anthraquinones causes abdominal cramps, gastrointestinal discomforts, vomiting, dermatitis, nausea, bloody diarrhea and dizziness [22], [23].

• Hypokalemia, muscle damage, dehydration, kidney damage, miscarriage due to reflex contractions in the uterus during pregnancy etc are some clinical conditions that may occur due to prolonged use of anthraquinones [24], [25]

Conclusion

Thus anthraquinone is for therapeutic purposes found to be naturally occurring in plants. However its prolonged use may have some side effects therefore its intake should be under a doctor's supervision.

Competing Interests

The authors have declared that no competing interests exist.

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