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A REVIEW OF PHARMACOGNOSTIC AND PHARMACOLOGICAL STUDY ON VACCINIUM CYANOCOCCUS

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Abstract

The Vaccinium L. (Ericaceae) genus consists of a globally widespread and diverse genus of around 4250 species, of which the most valuable is the Vaccinioidae Sub-family. (1) The current review focuses on the distribution, history, bioactive compounds, and health-related effects of three species: cranberry, blueberry, and huckleberry. Several studies highlight that the consumption of Vaccinium spp. presents numerous beneficial health-related outcomes, including antioxidant, antimicrobial, anti-inflammatory, and protective effects against diabetes, obesity, cancer, neurodegenerative diseases and cardiovascular disorders. These plants' prevalence and commercial value have enhanced in the past several years; thus, the generated by-products have also increased. Consequently, the identified phenolic compounds found in the main bioactive compounds identified in this genus belong to anthocyanins (cyanidin, malvidin, and delphinidin), flavonoids (quercetin, isoquercetin, and astragalin), phenolic acids (gallic, p-Coumaric, cinnamic, syringic, ferulic, and caffeic acids), and iridoids.their beneficial effects on vascular and glucoregulatory function. Blueberry phytochemicals may affect gastrointestinal microflora and contribute to host health. These aspects have implications in degenerative diseases and conditions as well as the aging process. To better understand the potential for anthocyanin-rich blueberries to benefit public health.

Keywords: vaccinium cyanococcus, Pharmacological Activities, Phytoconstituents, Traditional Use.

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Introduction

Blueberry is a widely distributed and widespread group of perennial flowering plants with blue or purple berries. They are classified in the section Cyanococcus within the genus Vaccinium [1]. Commercial blueberries both wild (lowbush) and cultivated (highbush) are all native to North America. The highbush varieties were introduced into Europe during the 1930s. Blueberries are usually prostrate shrubs that can vary in size from 10 centimetres (4 inches) to 4 meters (13 feet) in height. In commercial production of blueberries, the species with small, pea-size berries growing on low-level bushes are known as "lowbush blueberries" (synonymous with "wild"), while the species with larger berries growing on taller, cultivated bushes are known as "highbush blueberries". Canada is the leading producer of lowbush blueberries, while the United States produces some 40% of the world's supply of highbush blueberries.

Wild blueberries reproduce by cross-pollination, with each seed producing a plant with a different genetic composition, causing within the same species differences in growth, productivity, colour, leaf characteristics, disease resistance, flavour, and other fruit characteristics. The mother plant develops underground stems called rhizomes, allowing the plant to form a network of rhizomes creating a large patch (called a clone) which is genetically distinct. Floral and leaf buds develop intermittently along the stems of the plant, with each floral bud giving rise to 5–6 flowers and the eventual fruit.

Wild blueberries prefer an acidic soil between 4.2 and 5.2 pH and only moderate amounts of moisture. They have a hardy cold tolerance in their range in Canada and the northern United States [2].

Cyanococcus blueberries can be distinguished from the nearly identical-looking bilberries by their flesh color when cut in half. Ripe blueberries have light green flesh, while bilberries, whortleberries and huckleberries are red or purple throughout.

Fig.no:1vaccinium cyanococcus

Classification

Taxonomic hierarchy of the investigated plant:

- Kingdom -Plantae
- Clade - Angiosperms
- Clade - Eudicots
- Clade - Asterids
- Order - Ericales
- Family - Ericaceae
- Genus - Vaccinium
- Species -cynacoccus

Vernacular Names

- English – Blueberries
- Hindi – Neelbadari
- Telugu – Neelabadduka
- Tamil – Arugampulli
- Kanada – Neelhannu
- French – Bleuets

Geographical Distribution and Cultivation

Vaccinium has a mostly circumpolar distribution, with species mainly present in North America, Europe, and Asia. Many commercially available species with English common names including "blueberry" are from North America, particularly Atlantic Canada and the northeastern United States for wild (lowbush) blueberries, [2] and several US states and British Columbia for cultivated (highbush) blueberries.

- Vaccinium cyanococcus are to explore its chemical composition, medicinal properties, and identify the active compounds present in vaccinium cyanococcus.
- Through these studies, researchers aim to determine the therapeutic effects of Indian hog plum on various diseases and disorders.
- Additionally, they aim to authenticate fresh vaccinium cyanoccus by conducting these studies.
- Vaccinium is known to be a rich source of vitamin C, antioxidants, and has antidiabetic, anticancer, antianemia, hypoglycemic, and antiulcer properties.
- Therefore, the pharmacological study aims to identify the potential health benefits of Indian hog plum, while the pharmacognostic study aims to identify its characteristics.

Plant Profile

Morphology

The plants are deciduous perennial shrubs that range in size from 60 cm (24 inches) tall for lowbush blueberries (Vaccinium angustifolium) up to 4 meters (13 feet) tall for highbush (V. corymbosum) cultivars. They have simple elliptical leaves that are arranged alternately along the dotted stems. The plants produce clusters of small urn-shaped flowers that range in color from white to pale pink. The fruits are true berries with many small seeds and are a deep indigo to black color when ripe [4].

Leaves

Blueberry bushes have leaves that are dark green with yellow accents on the veins. They are smooth and do not have serrated edges. Leaf clusters are pinnate, and tend to grow in small groupings (6 or less). Blueberry leaves are ovate, in an irregular oval or slightly egg shape that is wider at the bottom than the top. During the fall they turn brilliant shades ranging from yellow to bright crimson, depending on the species. Shape: Ovate, elliptical, or lanceolate, Size: 1-3 inches (2.5-7.6 cm) long, 0.5-1.5 inches (1.3-3.8 cm) wide, Color: Dark green above, light green below [3].

Fig: 2 leaves of vaccinium cyanococcus

Roots

The blueberry plant is a woody shrub that belongs to the heath family. It has a shallow root system that is made up of fine, fibrous roots that spread out horizontally just below the soil surface [2].

Fig: 3 roots of vaccinium cyanococcus

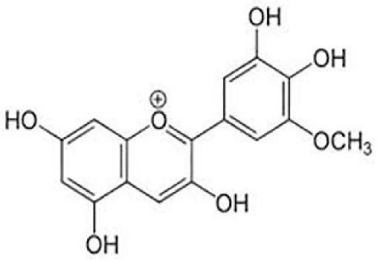
Phytochemical Constituent:

Phytochemicals in blueberries include

1. **Anthocyanins:** These antioxidants give blueberries their color and may reduce the risk of heart disease.
2. **Quercetin:** High intake of this flavonol has been linked to lower blood pressure and reduced risk of heart disease.
3. **Myricetin:** This flavonol may help prevent cancer and diabetes1.
4. Proanthocyanidins, resveratrol, and ellagic acid are also present in blueberries

The major phytochemicals in blueberries are polyphenols, including anthocyanins, proanthocyanidins, other flavonoids, phenolic acids and stilbene derivatives. [5].

Anthocyanins:



Different Pharmacological Activities

Diuretic and Laxative activity:

The diuretic and laxative activity of different extracts of the barks of blueberries were studied in Wistar albino rats. Furosemide and agar-agar were used as reference standards respectively for activity comparison. The chloroform and methanol extracts produced significant diuretic and laxative activity. On the other hand, the petroleum ether extract did not reveal significant activity. Urinary levels of sodium, potassium and chloride were estimated [9].

Antioxidant and free radical scavenging activity

A 70% methanol extract of blueberries stem bark was studied in vitro for total antioxidant activity, for scavenging of hydroxyl radicals, superoxide anions, nitric oxide, hydrogen peroxide, peroxynitrite, singlet oxygen and hypochlorous acid, and for irons chelating capacity, reducing power, and phenolic and flavonoid contents. The extract showed total antioxidant activity with a trolox equivalent antioxidant concentration value of 0.78 +/- 0.02.

Anticancer activity

The present study is aimed to investigate the role of 70 % methanolic extract of S. Pinnata bark in promoting apoptosis in human lung adenocarcinoma cell line and human breast adenocarcinoma cell line. These two malignant cell lines and a normal cell line were treated with increasing concentrations of the extract and cell viability is calculated. The extract showed significant cytotoxicity to both the carcinoma cells with an IC50 value of 147.84 ± 3.74 and 149.34 ± 13.30 µg/ml, respectively, whereas, comparatively no cytotoxicity was found in normal human lung fibroblast cell line with IC50 value of 932.38 ± 84.44 µg/ml

Antibiotic and Cytotoxic activity

Attempt was undertaken to study the antibacterial potency and cytotoxic activity of 80% ethanol extract of the fruits of Spondias pinnata.

Hypoglycemic activity

The various extracts of the barks of Spondias pinnata was evaluated for hypoglycaemic activity on adult Wistar albino rats at dose levels of 300 mg/kg p.m. each using normoglycaemic, glucose loaded and alloxan induced hyperglycaemic rats. Glibenclamide was used as reference standard for activity comparison. Among the tested extracts, the methanol extract was found to produce promising results that is comparable to that of the reference standard glibenclamide [10,11].

Analgesic Activity

The ethanol extract of Spondias pinnata was obtained from the dried stem barks of S. pinnata and its analgesic properties investigated using acetic acid, formalin test and hot plate model. Ethanol extract of S. pinnata showed analgesic effects in a dose dependent manner in the acetic acid test and in the second phase of formalin test which were comparable to the effects observed with acetylsalicylic acid. The results of this study lead credit to the traditional uses S. pinnata, especially as an analgesic [12].

Applications

Health Benefits of Vaccinium Cyanococcus:

- Good for Digestive Health
- Improves Haemoglobin Production
- Serves as Diuretic and Febrifuge
- Role in weight control
- Treat anaemia
- Keep skin healthy
- Protects Against Heart Disease
- Treat Dysentery
- Common Disease
- Protect against heart disease
- Promotes muscle strength
- Helps in muscle contraction and condition of nerve signals.
- Balance body temperature.(13)

Traditional Benefits of Vaccinium Cyanococcus

Benefits of Bark

- Bark and/or leaves used for coughs, fever, constipation, yaws, gonorrhea, Tapeworm, stomach problems, and as a childbirth aid.
- Used as an astringent, anti-inflammatory, stomachic, anthelmintic, vermifuge and antispasmodic; for diarrhea, dysentery, and hemorrhoids.
- Used as an antispasmodic, astringent, tonic, and emetic; for diarrhea, gonorrhea, and hemorrhoids.
- Tikuna Indians use it as a contraceptive, analgesic and hemostat; for diarrhea, metrorrhagia and stomachache [13].

Benefits of Plants:

Used as a laxative; for coughs, gonorrhea, ophthalmia, sore throat, and urethritis. Cuna Indians use it for asthma, colds, and congestion. Used as an astringent, and gargle; for colds, diarrhea, erysipelas, nephritis, sores, sore throat, and thrush. Used as an analgesic, astringent, diuretic, laxative, and vermifuge; for asthma, cancer, colds, congestion, cough, diarrhea, erysipelas, fever, gonorrhea, leprosy, malignancy, nephritis, ophthalmia, sore, swelling, thrush, tumors, urethritis, and wounds.

Culinary Uses

The pulp can be eaten fresh or made into desserts or juice.
Seeds are also edible.
Fruit can be consumed raw or cooked [3].
It is also used for making jams, ice cream etc.
Unripe fruits are pickled and used like olives.
Young leaves can be cooked and used as a vegetable.
The shoot tastes like cassava and can be eaten raw or boiled. When fresh water is unavailable, water from the roots of this tree can be drunk.

Conclusion

Different areas for its pharmacological activities by utilizing several experimental screening models and based on the previous research works, it could be concluded that this plant has the potential to be explored as a natural medicinal source. It is alleged that the comprehensive information presented in this review on its pharmacological activities offer enticement for proper evaluation of the uses of various parts of this plant in medicine. The use of this plant as conventional drug requires further medicochemical investigation. Treatment of obesity, hemorrhagic disease, anti vomit, dyspepsia, gonorrhea, severe cough, aphrodisiac, leprosy, diabetes, diuretic, eye inflammation, Antithirst, antioxidant, antimicrobial, thrombolytic agent, purgative2,4 . Fruit is astringent, sour, thermogenic, appetizer and aphrodisiac and is good for rheumatism and sore throat. In Ayurveda, the unripe fruits are believed to destroy “vata”, enrich the blood and cures rheumatism. Fruits are very nutritious and rich in vitamin A, minerals and iron content. The bark is useful in dysentery and diarrhea and is also prevent vomiting. The leaves are astringent, aromatic and acidic. The root is considered useful in regulating menstruation. The plant is reported to have antitubercular properties.

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