

Blue Tea California In The Treatment of Varies Disease

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Abstract- *Clitoria ternatea*, commonly known as blue tea, is a medicinal plant from the Fabaceae family. It contains a large amount of anthocyanins, which are known for their antioxidant properties. This plant is rich in several compounds, including triterpenoids, flavanol glycosides, tannins, alkaloids, amino acids, proteins, ternatins (special anthocyanins), and carbohydrates. Various lab studies have shown that *Clitoria ternatea* has multiple health benefits. It has antioxidant, antimicrobial, antidiabetic, liver-protective, brain-boosting, antidepressant, anti-anxiety, anti-inflammatory, pain-relieving, and wound-healing properties, among others. Research also suggests it can help in treating neurological conditions, inflammation, and diseases caused by oxidative stress.

I. INTRODUCTION

The antioxidants in blue tea work by neutralizing harmful molecules called free radicals (also known as reactive oxygen species) that can damage cells in the body. These free radicals cause oxidative stress, which leads to cell damage, premature aging, and potentially cell death. The antioxidants help to prevent or reduce this damage by stabilizing the free radicals, making them less harmful. In simple terms, antioxidants protect our cells from damage and help maintain healthy functioning of the body. Blue tea, derived from *Clitoria ternatea*, offers a range of health benefits. It works by scavenging free radicals, inhibiting oxidative enzymes, chelating metal ions, and acting as a cofactor for antioxidant enzymes. Some of its key benefits include aiding in weight loss, calming the mind, detoxifying the body, promoting hair growth, enhancing skin texture, and providing anti-depressant, sedative, antidiabetic, and liver-protective properties. Recent research focuses on its effectiveness and mechanisms of action based on in-vivo studies.

Key words-

Clitoria ternatea, Blue tea, Anthocyanins, Antioxidant properties, Phytoconstituents, Triterpenoids, Flavanol glycosides, Tannins, Alkaloids, Ternatins, Antimicrobial, Antidiabetic, Hepatoprotective, Nootropic, Antidepressant, Anti-inflammatory, Anticancer, Pharmacological properties, Neurological diseases, Oxidative stress, Preclinical studies

1. *Clitoria ternatea* –

Clitoria ternatea, commonly known as butterfly pea, blue pea, or Asian pigeonwings, is a herbaceous perennial plant belonging to the family Fabaceae. It is native to tropical equatorial Asia but is now grown in many parts of the world for its striking deep blue flowers, medicinal properties, and as an ornamental plant.

Key Characteristics:

Scientific Name: *Clitoria ternatea*

Common Names: Butterfly pea, blue pea, Asian pigeonwings, aparajita (India), bunga telang (Malaysia)

Plant Type: Perennial herbaceous plant

Height: Can grow up to 3 meters as a vine

Leaves: Pinnate, with 5-7 oval leaflets

Flowers: Vivid blue with a yellow throat, shaped like a butterfly. White variants also exist.

Fruit: A flat, pod-like legume containing 6–10 seeds.

Uses:

1. Culinary:

The flowers are commonly used to color food and beverages. In Southeast Asia, it is used to prepare a natural blue dye for rice, desserts, and teas.

The flowers can be steeped in water to produce a blue tea, which changes color to purple when lemon or other acids are added.

2. Medicinal:

Traditional medicine uses butterfly pea for its anti-inflammatory, analgesic, and cognitive-enhancing properties.

It is known for its potential benefits in improving memory, reducing anxiety, and managing stress.

Rich in antioxidants, it may have anti-aging properties.

3. Ornamental: The vibrant blue flowers make it a popular choice in gardens and landscape design, particularly as a climbing vine.

4. Agricultural: In some regions, it is grown as a cover crop to improve soil fertility due to its nitrogen-fixing ability.



Chemical Constituents:

The plant contains various bioactive compounds, including flavonoids, saponins, and anthocyanins (responsible for the blue color).

Growing Conditions:

Soil: Prefers well-drained soil and can tolerate a wide range of soil types.

Light: Grows best in full sunlight but can also adapt to partial shade.

Water : Requires regular watering but the plant is drought-tolerant once established.

Propagation: Commonly propagated from seeds or cuttings.

Due to its diverse uses and adaptability, *Clitoria ternatea* is gaining popularity in both traditional and modern contexts.

2. Blue tea-

Blue tea, also known as butterfly pea tea, is a herbal tea made from the dried flowers of the *Clitoria ternatea* plant, commonly referred to as butterfly pea or blue pea. This tea is known for its vibrant blue color, which can change to purple or pink when acidic ingredients like lemon juice are added.

Here are a few key features of blue tea:

Color: The tea has a striking natural blue hue, which can be altered with pH changes, making it visually appealing for culinary uses.

Health benefits: Blue tea is rich in antioxidants, particularly anthocyanins, which are thought to support brain health, improve skin, and reduce stress.

Flavor: It has a mild, earthy flavor, often described as similar to green tea but less grassy.

Caffeine-free: Since it's a herbal tea, it contains no caffeine, making it a great option for those looking to avoid stimulants. People often enjoy blue tea both for its aesthetic appeal and potential health benefits.



3. Anthocyanins -Anthocyanins are water-soluble pigments found in plants that belong to the flavonoid group. They are responsible for the red, purple, blue, and violet colors of many fruits, vegetables, and flowers. In blue tea, particularly made from the butterfly pea flower (*Clitoria ternatea*), anthocyanins play a significant role in its vibrant color and health benefits.

Here's how anthocyanins relate to blue tea:

1. **Source:** Blue tea's distinct color comes from anthocyanins found in the butterfly pea flower. These pigments can appear blue in neutral or basic pH conditions, but change color depending on the acidity of the liquid—becoming pink or purple in more acidic solutions.

2. **Health Benefits:**

Antioxidant properties: Anthocyanins are potent antioxidants, which means they help neutralize harmful free radicals in the body, potentially reducing oxidative stress and inflammation.

Anti-inflammatory: They may help reduce inflammation, contributing to overall cardiovascular and brain health.

Vision improvement: Some studies suggest that anthocyanins can improve night vision and overall eye health by promoting blood circulation in the eyes.

Neuroprotective effects: The antioxidant nature of anthocyanins may help protect brain cells from oxidative damage, potentially improving cognitive function and memory.

3. Potential uses:
4. Natural pH indicator: Due to its color-changing properties, blue tea (rich in anthocyanins) can act as a natural pH indicator. Adding lemon juice or another acid to blue tea will turn it purple or pink.

Coloring agent: The natural blue color from anthocyanins makes blue tea an attractive ingredient in culinary arts for beverages, desserts, and even cocktails.

In addition to its vibrant color, anthocyanins in blue tea provide potential health benefits that make it a popular drink choice beyond its aesthetic appeal.

4. Antioxidant properties -

Blue tea, made from the butterfly pea flower (*Clitoria ternatea*), is known for its vibrant color and rich antioxidant properties. Here's an overview of its antioxidant benefits:

1. Rich in Anthocyanins

The vivid blue color of butterfly pea tea comes from anthocyanins, a type of flavonoid that acts as a powerful antioxidant. Anthocyanins help neutralize free radicals, reducing oxidative stress and slowing down cellular aging.

2. Protection Against Chronic Diseases

By fighting oxidative stress, the antioxidants in blue tea may lower the risk of chronic diseases, including heart disease, diabetes, and certain cancers. Antioxidants help reduce inflammation, a key factor in many chronic conditions.

3. Skin Health

The antioxidant properties in blue tea support skin health by promoting collagen production and protecting against UV-induced damage. This can help slow the formation of wrinkles and improve skin elasticity.

4. Improved Cognitive Function

Some studies suggest that antioxidants like proanthocyanidins and flavonoids in blue tea can support brain health by reducing oxidative stress, which may improve memory and cognitive function and reduce the risk of neurodegenerative diseases.

5. Eye Health

Blue tea is also believed to promote eye health by protecting retinal cells from damage caused by free radicals, reducing the risk of eye diseases like cataracts and glaucoma.

In summary, blue tea is packed with antioxidants that help protect against cell damage, aging, and chronic diseases, making it a beneficial addition to a healthy lifestyle.

5. Phytoconstituents-

Blue tea, often made from the flowers of the butterfly pea plant (*Clitoria ternatea*), is gaining popularity for its health benefits and vibrant blue color. The key phytoconstituents in blue tea and their potential therapeutic effects include:

Key Phytoconstituents

1. Anthocyanins

Description: These are water-soluble pigments responsible for the blue color of the tea. The primary anthocyanin in butterfly pea is cyanidin-3-glucoside.

Therapeutic Effects:

Antioxidant properties, helping to combat oxidative stress.
Anti-inflammatory effects, which may benefit cardiovascular health.

Potential anti-cancer effects by inhibiting tumor growth.

2. Flavonoids

Description: This class of compounds includes flavones and flavonols, which contribute to the tea's antioxidant properties.

4. Therapeutic Effects:

Support for brain health by improving cognitive function.

Reduction of blood pressure and cholesterol levels.

Anti-allergic and anti-inflammatory effects.

5. Phenolic Compounds

Description: These compounds are known for their antioxidant properties and include various phenolic acids.

Therapeutic Effects:

Protection against chronic diseases such as diabetes and heart disease.

Support for gut health through modulation of gut microbiota.

6. Tannins

Description: Tannins are polyphenolic compounds that have astringent properties.

Therapeutic Effects:

Antimicrobial properties, which can help in fighting infections.

Potential benefits in reducing the risk of chronic diseases.

Health Benefits

1. Antioxidant Activity

Blue tea is rich in antioxidants that help neutralize free radicals, reducing oxidative stress and preventing cellular damage.

2. Anti-Inflammatory Effects

The compounds in blue tea may help reduce inflammation in the body, benefiting conditions like arthritis and other inflammatory disorders.

3. Cognitive Enhancement

Regular consumption of blue tea may enhance cognitive function and memory due to its neuroprotective effects.

4. Anxiety and Stress Relief

The calming properties of blue tea may help alleviate anxiety and stress, promoting relaxation.

5. Skin Health

The antioxidants in blue tea can benefit skin health by reducing signs of aging and promoting a healthy complexion.

Conclusion

Blue tea, particularly from the butterfly pea flower, is rich in various phytoconstituents that offer numerous health benefits. While more research is needed to fully understand its effects,

incorporating blue tea into a balanced diet may support overall health and wellness. Always consult with a healthcare professional before starting any new herbal treatment, especially for specific health conditions.

6. Triterpenoids-

Blue tea, particularly made from the *Clitoria ternatea* plant, also known as butterfly pea flower, has gained attention for its potential health benefits, including the presence of triterpenoids. Here's an overview of triterpenoids in blue tea and their therapeutic applications:

What Are Triterpenoids?

Triterpenoids are a class of chemical compounds derived from triterpene structures, consisting of 30 carbon atoms. They are known for their diverse biological activities and are found in various plants. Triterpenoids can have antioxidant, anti-inflammatory, antimicrobial, and anticancer properties.

Triterpenoids in Blue Tea

1. Presence: Studies have identified several triterpenoids in *Clitoria ternatea*, including:

Betulinic Acid: Known for its anticancer properties.

Oleanolic Acid: Exhibits anti-inflammatory, antiviral, and hepatoprotective effects.

Ursolic Acid: Has antioxidant and anti-inflammatory effects, promoting overall health.

2. Extraction: Triterpenoids can be extracted from the leaves and flowers of *Clitoria ternatea*. The method of extraction can influence the yield and bioavailability of these compounds.

Therapeutic Applications

1. Antioxidant Properties: Triterpenoids are potent antioxidants, which help in scavenging free radicals and reducing oxidative stress in the body.
2. Anti-Inflammatory Effects: These compounds can modulate inflammatory pathways, making blue tea beneficial for conditions related to inflammation, such as arthritis.
3. Anticancer Potential: Certain triterpenoids have shown promise in inhibiting cancer cell proliferation and inducing apoptosis (programmed cell death) in various cancer models.
4. Cognitive Benefits: Blue tea is often associated with improved cognitive function. Triterpenoids may contribute to neuroprotective effects, which could be beneficial in preventing neurodegenerative diseases.
5. Liver Health: Triterpenoids like oleanolic acid have hepatoprotective effects, which may help in maintaining liver health and function.

Conclusion

Blue tea is rich in triterpenoids that contribute to its health benefits, including antioxidant, anti-inflammatory, and

anticancer properties. While traditional use and preliminary studies support these benefits, more clinical research is needed to fully understand the mechanisms and effectiveness of triterpenoids in treating specific health conditions.

If you're considering using blue tea for its health benefits, it's a good idea to consult with a healthcare professional, especially if you have underlying health conditions or are taking other medications.

7. Flavanol glycosides-

Flavanol glycosides are a type of flavonoid, which are plant-derived compounds known for their antioxidant properties and potential health benefits. Flavanols, specifically, are a subgroup of flavonoids characterized by their structure, which includes a 15-carbon skeleton typically composed of two aromatic rings connected by a three-carbon chain.

Key Features of Flavanol Glycosides:

1. Structure: Flavanol glycosides consist of a flavanol backbone (such as catechin or epicatechin) linked to one or more sugar molecules (glycosides). The sugar moiety can affect the solubility, stability, and biological activity of the flavanol.
2. Sources: They are found in various fruits, vegetables, tea (especially green tea), cocoa, and red wine. Common examples include quercetin glycosides and flavan-3-ol glycosides from cocoa and tea.
3. Health Benefits:

Antioxidant Activity: They scavenge free radicals and reduce oxidative stress in the body.

Cardiovascular Health: Flavanol glycosides are linked to improved blood circulation, lower blood pressure, and reduced risk of heart disease.

Anti-Inflammatory Effects: They may help reduce inflammation and lower the risk of chronic diseases associated with inflammation.

Cognitive Benefits: Some studies suggest a potential role in enhancing cognitive function and reducing the risk of neurodegenerative diseases.

4. Absorption and Bioavailability: The bioavailability of flavanol glycosides can vary based on their chemical structure and the presence of other compounds in the diet. They are often metabolized by gut bacteria into smaller phenolic compounds, which may also contribute to their health benefits.
5. Research: Ongoing research continues to investigate the specific mechanisms of action, optimal dosages, and long-term effects of flavanol glycosides on human health.

Incorporating foods rich in flavanol glycosides into your diet can be a delicious way to enhance overall health. However, it's important to consume them as part of a balanced diet for maximum benefit.

8. Tannins-

Blue tea, often made from the butterfly pea flower (*Clitoria ternatea*), is a herbal infusion known for its vibrant blue color and numerous health benefits. Tannins are indeed present in blue tea, although their concentration is generally lower than in other tea types like black or green tea.

Tannins in Blue Tea

1. **Source:** The primary source of tannins in blue tea is the butterfly pea flower itself. Tannins in these flowers contribute to their astringent taste and antioxidant properties.
2. **Health Benefits:**

Antioxidant Properties: Tannins have strong antioxidant effects that can help protect cells from damage caused by free radicals.

Anti-Inflammatory Effects: Tannins can help reduce inflammation, which may benefit overall health.

Digestive Health: The presence of tannins may aid in digestion and contribute to gut health by promoting beneficial gut bacteria.

3. **Flavor Profile:** While blue tea is typically mild and slightly earthy, the tannins contribute to a subtle astringency. However, the taste is often more influenced by the flowers' natural sweetness and floral notes rather than tannins.
4. **Color Changes:** When blue tea is mixed with acidic ingredients (like lemon or lime juice), the color changes from blue to purple or pink. This change is due to the presence of anthocyanins (another group of plant compounds), which may interact with the tannins and other components in the tea.
5. **Brew Time and Temperature:** To minimize excessive tannin extraction, it's recommended to brew blue tea at lower temperatures and for shorter durations, similar to brewing green tea.

Conclusion

Tannins in blue tea add to its health benefits and contribute to its flavor, although their levels are generally lower compared to traditional teas. Blue tea is a refreshing beverage that combines the beauty of its color with potential health advantages, making it popular in various cultures.

9. Antimicrobial-

Antimicrobial Effects

1. **Inhibition of Bacteria:** Some studies suggest that extracts from butterfly pea flowers can inhibit the growth of harmful bacteria like *E. Coli* and *Staphylococcus aureus*.
2. **Fungal Activity:** There is also evidence that blue tea can combat certain fungi, making it potentially useful in treating fungal infections.

3. **Anti-inflammatory Properties:** The anti-inflammatory effects may help in reducing the severity of infections and promoting healing.

Potential Uses

Supportive Treatment: While blue tea may not replace traditional antimicrobial treatments, it can be used as a complementary beverage to support overall health.

Oral Health: The antimicrobial properties may also benefit oral health by reducing harmful bacteria in the mouth.

Conclusion

While more research is needed to fully understand the extent of blue tea's antimicrobial properties, its bioactive compounds suggest it may offer some benefits in combating infections. However, it should not be considered a substitute for medical treatments. Always consult with a healthcare provider for serious health issues.

10. Anticancer -

Blue tea, also known as butterfly pea flower tea (made from the *Clitoria ternatea* plant), has gained popularity for its vibrant blue color and potential health benefits. While it's not a treatment for cancer itself, there are several ways it may support overall health, particularly in the context of cancer:

1. **Antioxidant Properties:** Blue tea contains antioxidants such as flavonoids and anthocyanins, which help combat oxidative stress in the body. Reducing oxidative stress may help protect cells from damage, which is a factor in cancer development.
2. **Anti-Inflammatory Effects:** Chronic inflammation is associated with various types of cancer. Some studies suggest that the compounds in butterfly pea flower may have anti-inflammatory properties, potentially lowering the risk of inflammation-related diseases.
3. **Potential Anticancer Activity:** Preliminary studies have indicated that certain compounds found in butterfly pea may exhibit anticancer properties. For example, research has shown that extracts from the plant can inhibit the growth of some cancer cells in vitro (in a lab setting). However, more extensive clinical research is needed to establish any direct effects on cancer treatment.
4. **Supportive Health Benefits:** Blue tea is also believed to help with stress relief, boost immunity, and support overall wellness. For cancer patients, maintaining overall health and well-being can be an important part of their care.

Important Considerations

Not a Substitute for Conventional Treatment: It's essential to note that while blue tea may offer some health benefits, it

should not replace conventional cancer treatments such as chemotherapy, radiation, or surgery.

Consult Healthcare Providers: Cancer patients should always consult with their healthcare providers before adding any new supplements or herbal remedies to their regimen to ensure safety and compatibility with their ongoing treatments.

Conclusion

While blue tea has potential health benefits, its role in cancer treatment is still under research. Maintaining a balanced diet and a healthy lifestyle, along with following medical advice, remains crucial for cancer prevention and treatment.

11. Antidiabetic -

Blue tea, commonly made from the butterfly pea flower (*Clitoria ternatea*), has garnered attention for its potential health benefits, including its use in managing diabetes. Here are some ways blue tea is thought to assist in diabetes treatment:

1. **Antioxidant Properties:** Blue tea is rich in antioxidants, particularly anthocyanins, which may help reduce oxidative stress. This stress is linked to diabetes complications, and antioxidants can protect cells from damage.
2. **Blood Sugar Regulation:** Some studies suggest that compounds in butterfly pea flower may help regulate blood sugar levels. They might enhance insulin sensitivity or modulate glucose metabolism, though more research is needed to confirm these effects in humans.
3. **Anti-Inflammatory Effects:** Chronic inflammation is a contributor to insulin resistance. The anti-inflammatory properties of blue tea could potentially help in reducing inflammation, thereby improving metabolic health.
4. **Weight Management:** Maintaining a healthy weight is crucial for diabetes management. Blue tea may support weight loss or maintenance due to its low-calorie content and potential appetite-suppressing effects.
5. **Potential Cardiovascular Benefits:** Diabetes increases the risk of cardiovascular diseases. The cardiovascular benefits of blue tea, attributed to its antioxidant content, may help mitigate these risks.

Usage and Preparation

Tea Preparation: To make blue tea, steep dried butterfly pea flowers in hot water for 5-10 minutes. The resulting blue beverage can be consumed hot or cold and is often mixed with lemon or honey for flavor.

Dietary Integration: Blue tea can be included as part of a balanced diet, but it should not replace prescribed diabetes medications or treatments.

Precautions

While blue tea is generally safe for consumption, individuals with diabetes should consult healthcare professionals before using it as a treatment strategy, especially if they are on medication, to avoid potential interactions and ensure proper management of their condition.

Conclusion

Overall, while blue tea may offer some benefits for managing diabetes, more research is needed to establish its effectiveness and mechanisms of action fully.

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