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Biological and Chemical Research (ISSN 2312-0088), Vol.11, 11-17 | Science Signpost Publishing

The Effect of White Mulberry on CRP Lowering

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Received: October 20, 2023 / Accepted: November 18, 2023 / Published: January 25, 2024

Abstract: Berries are not only delicious but also incredibly healthy. They come in different colors, sizes and flavors - some are sweet, while others are a little tart. The great thing about berries is that they are low in calories and full of good things like antioxidants, fiber and vitamin C. These qualities make berries really good for your health and can help reduce the risk of disease and keep your cells in good shape. Some popular types of berries include blueberries, mulberries, raspberries, goji berries, strawberries, chokeberries, acai berries and cranberries. White mulberry from the berry family has a rich potential for lowering CRP levels in the blood. White mulberry (Morus alba) is an under-researched fruit, but has an important role. White mulberries are rich in anthocyanins and alkaloids and have pharmacological properties such as antioxidant, anti-diabetic, anti-atherosclerotic, anti-obesity and hepatoprotective activities. Various parts of the mulberry tree, including the leaves, roots and fruits, have been traditionally and currently used in agriculture, food, cosmetics and medicine. Due to their numerous promising effects on health, they are considered multifunctional plants with medicinal properties. In this article, we will examine the effects of white mulberry on CRP.

Introduction:

There is a global trend in the use of various plants known for their diverse bioactivities, including antioxidants, anti-inflammatory, anti-cancer, and anti-diabetic effects. White mulberry (Morus alba L.), a perennial tree or shrub, has been cultivated under various conditions worldwide and is particularly valuable for silkworms as their primary food source. The leaves of white mulberry are nutritious, palatable, and non-toxic, containing essential amino acids which are necessary for silkworm growth and potentially improving milk production in dairy animals. mulberry leaves contain protein, carbohydrates, calcium, iron, ascorbic acid, β-carotene, B-1, D vitamins, and folic acid, as well as rutin, quercetin, isoquercetin, and other flavonoids. White mulberry exhibits diuretic, hypoglycemic, and hypotensive medical properties, yet it remains relatively understudied, prompting further research.

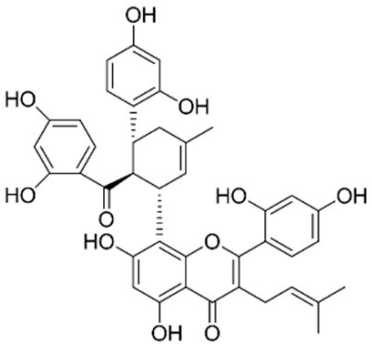
Chemical Differences Between Fresh White Mulberries and Dried Mulberries:

There are significant chemical differences between fresh white mulberries and dried mulberries. Consuming fresh white mulberries shortly after harvest is more beneficial as some of the active chemical compounds change within a few hours, reducing their natural antibiotic properties. The impact of fresh versus dried white mulberries on health is markedly different. Drying white mulberries under the sun during the summer months enhances their efficacy in addressing conditions like eczema.

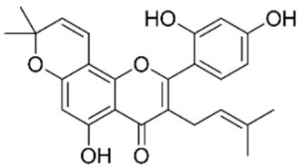
Key Active Compounds in White Mulberries:

* Thiamine……..Quercetin
Valeric acid……Potassium
Rutin…….Pelargonidine
Riboflavin……..Petunidin
Morusin……..Kvanone
Isoquercetin…….Sanggenon
Niacin……P-cresol
Antioxidant and Antibacterial Activities of White Mulberry (Morus alba L.) Fruit

SMs against CRP
In Bark:



Kuwanon G (1)



Morusin (2)

Mulberry (Morus alba L.) fruit

cyanidin-3-glucoside (C3G)
cyanidin-3-rutinoside (C3R)
p-coumaric and ferulic acid
naringin
γ-aminobutyric acid
benzyl D-glucopyranoside
2*α*, 3*β*-Dihydroxynortropane
N-Methyl-1-deoxynojirimycin
2*α*, 3*β*, 4*α*-Trihydroxynortropane

Epigallocatechin
Isorhamnetin glucuronide
Quercetin glucuronide
Cyanidin pentoside
Pelargonidin 3-*O*-glucoside
Gentisic acid
Jaboticabin

Extracts:

Previous studies have highlighted the presence of bioactive compounds like anthocyanins, rutin, and polysaccharides in mulberry extracts, demonstrating their potential in preventing conditions such as diabetes, cardiovascular diseases, Alzheimer's disease, and obesity. Mulberry extracts also exhibit antioxidant, anti-tumor, immunomodulatory effects, and are increasingly used in the cosmetic industry for their skin-whitening properties. Additionally, some mulberries have shown antibacterial activity against certain Gram-positive and Gram-negative bacteria. Research has investigated the antibacterial activity of ethanol and aqueous extracts of white mulberry against enteric pathogens and their effects on bacterial growth inhibition and adhesion to intestinal epithelial cells.In addition to Antioxidant and Antibacterial Activities of White Mulberry , these unique plants have anti-inflammatory properties on the human body.They have shown lowering effects on CRP levels which are major indicators of inflammation in the body.

Effects of Morus Alba Root Bark and Flavonoid Components on Airway Inflammation:

Chronic inflammatory respiratory diseases, such as chronic bronchitis and chronic obstructive pulmonary disease (COPD), can be challenging to treat with existing medications. Morus alba L. root bark has been traditionally used in Northeast Asia to treat various inflammatory conditions, including acute and chronic bronchitis. Flavonoid components such as kuwanon E, kuwanon G, and norartocarpanon have been found to inhibit the production of inflammatory biomarkers in lung cells, suggesting the potential therapeutic use of Morus alba and its flavonoid components in airway inflammation. To enhance a better understanding of the relation between Morus Alba and CRP marker, lets take a closer look to CRP and its function.

WHAT IS CRP AND WHY IT IS IMPORTANT?

CRP (C-reactive protein) is a biomarker used to assess inflammation in the body. When there is an elevation of CRP levels in the blood, it indicates the presence of inflammation or infection. CRP is produced by the liver in response to various inflammatory signals, particularly those triggered by infections, tissue damage, or chronic diseases. It plays a crucial role in the body's immune response to these challenges.Elevated CRP levels can occur in various conditions, including:Infections,Inflammatory Conditions: Chronic inflammatory diseases like rheumatoid

arthritis, lupus, or inflammatory bowel disease ,Tissue Injury: Physical injuries or trauma, such as burns or surgery,Cardiovascular Diseases and some other health conditions.

Understanding High Levels of C-Reactive Protein (CRP): Implications and Management

Interpreting Elevated CRP Levels

Upon encountering high CRP levels, healthcare professionals evaluate the extent of elevation relative to the established normal range. The degree of elevation can provide insights into potential underlying causes. Various conditions are associated with different degrees of CRP elevation:

Slight Elevation (3-10 mg/L):
- Obesity
- Pregnancy
- Smoking
- Diabetes
- Periodontal disease
- Mild viral infections (e.g., the common cold)

Moderate Elevation (over 10 mg/L):
- Autoimmune disorders (e.g., lupus, rheumatoid arthritis, inflammatory bowel disease)
- Heart attack
- Pancreatitis
- Respiratory infections (e.g., acute bronchitis)
- Some cancers (e.g., liver, lung, colon, breast, and endometrium)

Marked Elevation (over 100 mg/L):
- Serious bacterial or viral infections
- Systemic blood vessel inflammation (vasculitis)
- Major traumas or injuries

Severe Elevation (over 500 mg/L):
- Severe bacterial infections (sepsis)

The duration of elevated CRP levels is also a crucial parameter . Prolonged elevation often indicates chronic inflammation within the body's blood vessels. Chronic low grade inflammation contributes to the accumulation of fat and other substances within arterial walls, which may cause to atherosclerosis. This fat buildup can lead to coronary artery disease , potentially culminating in heart attack, stroke, or heart failure, even among individuals with elevated CRP levels who display no overt signs or symptoms of active inflammation.

Management of C-Reactive Protein Levels:

Several modifiable risk factors contribute to elevated CRP levels, offering avenues for intervention. High CRP levels are frequently associated with known risk factors for heart disease, such as smoking, obesity, an inactive lifestyle, high cholesterol, high blood pressure, diabetes, and metabolic syndrome (a combination of high blood pressure, high blood sugar, abnormal lipid levels, and excess abdominal fat). Patients with high CRP levels should consult their doctors regarding their individualized risk factors for heart disease and potential interventions to address both CRP levels and these risk factors.

Statins:

Medications, such as statins, which effectively lower cholesterol, has been shown to reduce CRP levels by %13 to %50.Moreover, statins significantly diminish the risk of heart attack and stroke in individuals with elevated CRP levels, even in the absence of overt inflammation symptoms. Commonly prescribed statins include Crestor (rosuvastatin), Lipitor (atorvastatin), Mevacor (lovastatin), Pravachol (pravastatin), and Zocor (simvastatin). Patients with high CRP levels, particularly those with additional risk factors for heart disease, should initiate a conversation with their healthcare provider regarding statin treatment.

Aspirin:

While aspirin alone does not specifically lower CRP levels, daily aspirin therapy is occasionally employed as a preventive measure against heart attacks and strokes. Nevertheless, the risks associated with daily aspirin usage can sometimes outweigh the potential preventive benefits. Therefore, patients who are considering this treatment should discuss the issue with their physicians.

MORUS ALBA AS A NATURAL REMEDY TO LOWER CRP LEVELS AND ITS RELATION WITH CRP LEVELS:

Morus alba, commonly known as white mulberry, has shown potential in lowering C-reactive protein (CRP) levels. Research suggests that Morus alba's anti-inflammatory properties are attributed to its rich content of flavonoids, polyphenols, and resveratrol . These bioactive compounds have been found to suppress the inflammatory response by reducing oxidative stress and modulating the production of pro-inflammatory cytokines.

WHICH SPECIFIC COMPOUND IN MORUS ALBA DECREASES CRP LEVELS?

There is a specific compound in Morus Alba that significantly lowers CRP levels and it is called LECTINS. Lectins, also known as agglutinins, are proteins or glycoproteins found on cell surfaces, extracellular matrices or secreted glycoproteins. They have the ability to bind to soluble carbohydrates or carbohydrate components found in glycoproteins or glycolipids. This binding often results in agglutination of certain animal cells or precipitation of glycoconjugates. Lectins play crucial roles in

the innate immune system and contribute to the initial defense against invading microorganisms, with lectins such as mannose-binding lectin being notable examples. While each lectin molecule can have mono-, divalent or polyvalent carbohydrate binding sites, lectins with agglutinating properties, called agglutinins, invariably contain more than two binding sites in each molecule. Lectin molecules are common in a wide range of living organisms, including microbes, plants, animals and humans. Based on their structural and biochemical properties, the six major humoral lectins have been divided into four families: pentraxins (which include C-reactive protein and serum amyloid protein), collectin (represented by mannan-binding lectin), phycolins (encompassing H-ficolin and L-ficolin) and tetranectin. Lectins primarily recognize and bind to specific carbohydrate structures present on the surfaces of target cells and molecules (Sharon, 2007).

In particular, they exhibit considerable diversity in their sugar binding specificity, allowing them to recognize whole sugars, specific sugar segments, sugar sequences or glycosidic linkages with high sensitivity.

CRP is a glycoprotein. We said that lectin is also a type of protein that can bind to sugar. If lectin binds to glycosides in the CRP structure, it inhibits and lowers CRP. The CRP-lowering lectin we are talking about here is found in white mulberry. So does lectin bind to CRP under all conditions? No, it does not. There are some conditions for this to happen. These conditions are as follows;

● pH should be above 4.6. The environment should not be too acidic.

● Ca concentration must be in a certain range.

● And the sugar to which the lectin will bind must be galactose or mannose. It does not bind to other sugars.

WHICH MULBERRIES SHOULD WE USE?

Anatolian mulberries, also known as Morus nigra or black mulberries originate from the Anatolian region in Turkey. There types of mulberries ara the most common types to acquire anti inflammatory benefits . Kemaliye (Eğin) mulberry, a type of Morus alba , was registered bu the Turkish Patent and Trademark Office and received its geographical indication. Its benefits are quite high. It gives strength to the body and is good for anemia. It is useful against mouth, tonsil and throat inflammation, gum diseases and cough. Reduces fever. It strengthens the liver. It helps the stomach and intestines to work regularly. It facilitates digestion, especially when eaten with food. If eaten on an empty stomach, it relieves constipation and can even cause diarrhea, it also helps to reduce intestinal worms. To obtain anti-inflammatory benefits of mulberry we can use Kemaliye mulberry.

HOW TO USE MORUS ALBA TO LOWER CRP LEVELS?

As we deduce , Morus Alba has extended potential to lower CRP levels in virtue of its biochemical structure .To use this property of Morus Alba in an efficient way , you can add handful of mulberries into half a liter of boiling unchlorinated water and boil for six minutes over low heat,covered. Remove from the stove after six minutes. When it is warm, strain it and drink half of it in the morning on empty stomach and the other half in the evening on empty stomach . Drink twenty minutes before breakfast and dinner. It should be consumed fresh every day. It is not necessary to consume boiled mullberries. Apply for a total of twenty five days. If sufficient effect is not achieved, apply another twenty-five-day cycle without break.

Conflict of Interest Statement

The authors declare no conflict of interest.

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