



Original Research Article

**Human Body Function Regulatory Aminoacids Cysteine and Methionine containing plants**

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**A B S T R A C T**

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Amino acids cysteine and methionine containing plants were identified to explore their uses. The amino acids presented in collected plants were analyzed quantitatively by using amino acid analyzer and qualitatively by Millon's and Ninhydrin test. All the collected plants exhibited antioxidant properties. Cysteine and methionine containing plants prevent or used to treat fatty liver disease, central nervous system disease, stone formation in kidney, cardiovascular disease and regulates blood pressure without side effects.

**Introduction**

*"Let your food be your medicine and  
Let your medicine be your food"*

Human get vitamins, minerals, metals and aminoacids from plant foods. A number of mineral, aminoacids essential for human nutrition are accumulated in different parts of plants. Body takes sulphur and nutrient in form of amino acids from plants.

Amino acids cysteine and methionine are essential for protein synthesis, methylation, and biosynthesis of vitamins, polyamines and anti oxidants (San Sato *et al.*, 2009).

According to the world health organization (WHO) Adult essential amino acid requirements report 1985 recommended that the adult should take 13mg of methionine per Kg of body weight per day. Methionine is important for immune cell production, proper nerve function and in treating Parkinson's disease (Wirtz *et al.*, 2005). It helps to prevent fatigue, excess fat built up, skin and nail problems. Methionine deficiency can cause liver damage, muscle loss weakness, slow growth and skin lesions (Parcell *et al.*, 2002; Levine *et al.*, 1996; Brot *et al.*, 1991; Vogt *et al.*, 1995; Savige *et al.*, 1997)

Cysteine offers protection against nuclear radiation and preventing problems such as heart and stroke in people with serious kidney disease (Piste *et al.*, 2013). Cysteine removes toxic wastes from metabolism which is responsible for ageing. It can help to prevent hair loss and used in food, pharmaceutical and personal care industries. It prevents brain damage, liver damage from alcoholic hangover effect and lung damage caused by smoking (Goldenbrg *et al.*, 2007; Wang *et al.*, 2005; Suzanne *et al.*, 2007; Zlotkin *et al.*, 1982).

In the present work amino acids cysteine and methionine containing plants and its uses are presented.

## Materials and Methods

Based on Dr. Dukes phytochemical and Ethno botanical databases cysteine and methionine containing plants are selected, identified and collected from in and around Thiruvarur town located in Thiruvarur District. The collected plants were dried, powdered and hydrolyzed by HCl acid. The samples were freed from acid followed by eluted in column using 10% ammonia. After evaporation, the eluent hydrolyzed by distilled water taken for further qualitative and quantitative amino acid analysis. The quantitative analysis was carried out using amino acid analyzer.

### Qualitative analysis:

**Millon's test:** Millons reagent (5 drops) was added to 1 mL of test solution and heated on a water bath for 10 min, cooled and added 1% sodium nitrite solution. Appearance of red color confirmed the presence of amino acids.

**Ninhydrin test:** The hydrolyzed sample was run in paper chromatography using

ninhydrin as spray reagent. Cysteine and methionine amino acids as standard were also run with the sample (Ahmad., 1994).

## Results and Discussion

The amount of cysteine and methionine presented in selected plants and their applications with mechanism are discussed in this section. The plants selected for this work, their botanical name and the parts used for analysis are given in Table. 1

### **Moringa oleifera (Family: Moringaceae)**

Moringa oleifera is a highly valued super food with incredible potential to greatly improve health. This plant contains high amounts of protein, all essential amino acids, vitamins, minerals and powerful disease fighting antioxidants. The amount of methionine present in Moringa Oleifera is 350 mg.

Uses: Methionine in Moringa is preventing hair, skin, and nail problems. Methionine reduces liver fat and protects the kidneys. Methionine form chloine through transmethylate which is prevent fatty liver diseases. Methionine prevent liver from alcohol damage by lowers acetaldehyde level.

Cysteine functions as anti oxidant. It also aids in protein synthesis. It is necessary for the formation of new skin cells (Roopalatha and Nair, 2013; Shahriar *et al.*, 2012, Koruthu *et al.*, 2011).

### **Sesame (Sesamum Indicum, family: Pedalilaceae)**

Sesame seeds are considered for most mineral rich food. There are rich in anticancer lignin which is found in sesame seeds. The amount of aminoacids, minerals

and vitamins present in sesame seed per 100g as follows methionine 0.56 g, cysteine 0.34 g, calcium- 131 mg, magnesium- 346 mg, iron – 7.78 mg, zinc- 7.16 mg and fiber- 16.9 g. It is used as diuretic and laxative. Leaves are used to treat infections in kidney and bladder.

**Sunflower (*Helianthus annus*, family: Asteraceae)**

Seeds contain 640 mg methionine and bone healthy minerals, copper and magnesium which are stay strong the bones. They ease every condition that's inflammatory in nature such as joint pain, gastric ulcers because sunflower seeds are loaded with antioxidants. Seeds contain amino acids histidine, cysteine, Levine, tryptophan, phenylalanine and methionine. It is also a positive effect in both prevention and treatment of some central nervous system diseases its high content of vitamin E in the form of tocopherols because of high antioxidant effect.

**Pumpkin (*Cucurbita maxima*, family: cucurbitaceae)**

Pumpkin leaves contain 569 mg of methionine per 100 g. Pumpkin is a good source of vitamins A, C, E and B vitamins and fiber. Minerals wise its rich with potassium, iron, calcium, magnesium, phosphorus, copper, manganese, sodium and zinc. It is very valuable vegetable.

Pumpkin seeds have anti-inflammatory properties. The anti-oxidants effectively protect the respiratory system from infections. Beta carotene, lutein and zeaxan are special protection against cataracts. Taking about 5-10 gram of pumpkin seeds daily prevents stones formation in the kidneys. These healthful properties are best obtained by drinking of its juice regularly. In kidney and liver, homocysteine is

remethylated to methionine using the enzyme betaine homocysteine methyltransferase (BHMT) (Levine *et al.*, 2000).

**Coconut (*Cocos nucifera*, family: Areaceae)**

Coconut water contain 137 mg of methionine per 100 g. Coconut contains rich in nutrients, minerals such as potassium, magnesium, vitamins like riboflavin, niacin, thiamin, pyridoxine folates and low fat content. Coconut water has anti viral and anti bacterial properties that can help increase ours body's immune system. Coconut water helps improve blood circulation, reducing the raise of heart attacks and other cardiovascular troubles. Coconut water is beneficial to a person suffering from kidney disease. This water also acts as a diuretic.

Vitamin B<sub>2</sub> (riboflavin) and magnesium are also involved in homocysteine metabolism. Thus a person needs several different B-vitamins to help keep homocysteine levels low and allow for it to be properly transformed into helpful antioxidants like glutathione. Without B<sub>6</sub>, B<sub>12</sub>, B<sub>2</sub>, folate, and magnesium, homo cysteine cannot be converted to cysteine and reaches dangerous levels of homocysteine in the body.

**Cashew nut (*Anacardium occidentale*, family: anacardiceae)**

Cashew nut contain 279 mg of methionine per 100 g. Cashew nuts are high in calories. It contains minerals, manganese, potassium, copper, iron, magnesium, zinc and selenium. A handful of cashew nuts a day in the diet would provide enough these minerals and prevent deficiency diseases. Many essential vitamins are presented such as Vitamin B<sub>5</sub>, vitamin B<sub>6</sub> and vitamin B<sub>1</sub>. These vitamins

are essential for metabolism of protein, fat and carbohydrates at cellular levels. It is used to treat antimicrobial, toothache, memory disturbances and rheumatic pericarditis.

**Soya beans (*Glycine max*, family: *Fobaceae*)**

Soya beans contain 224 mg of methionine per 100 g. The level of sulfur amino acids in soya beans is higher than other beans and therefore soya protein is equal to animal protein in quality. It is a complete protein containing all the amino acids essential to human nutrition. It protects the liver and improved lipid metabolism in the injured liver.

**Onion (*Allium cepa* , family : *Alliaceae*)**

Onion contains methionine 3.2 mg and cysteine 6.4 mg. Cysteine is the stable form of amino acid containing sulfur. When sulfur is metabolized it combines with other substances to detoxify the body. Cystine protects against the free radicals produced by smoke and alcohol. Cysteine in therapeutic dose offers protection against nuclear radiation and x ray.

**Garlic (*Allium sativum*, family: *Alliaceae*)**

Garlic contains 76 mg of methionine per 100g. It reduces high blood pressure, purified the blood and reduced the risk of heart attacks and other cardio vascular troubles. Garlic increases the body resistance. They increase the disease resistant properties of the body. It increases the HDL or good cholesterol levels in the body. It acts as a good antibiotic and fungicide. The bulb is used as a brain tonic.

**Cabbage (*Brassica oleraceae*, Family: *Brassicaceae*)**

It contains 463 mg of methionine per 100g. The high content of vitamin C and sulfur in cabbage removes toxins (free radicals and uric acid) those are the main causes of arthritis skin diseases and rheumatism. Cabbage contains minerals like potassium, manganese, iron and magnesium. Potassium is an important component to cell and body fluids that helps controlling heart rate and blood pressure. Cabbage helps to dry up oily and acne skin. Internally sulfur is essential for keratin, a protein substance necessary for health hair, nail and skin.

Methionine is converted to S-Adenosylmethionine (SAM) in the presence of magnesium which is further converted to S- Adenosylhomocysteine (SAHH). Homocysteine is formed by the methylation of SAH. In trans-sulfuration process with the help of serine, vitamin B<sub>6</sub>, enzyme Cystathionine β-Synthase, homocysteine is converted in to Cystathionine. In presence of B<sub>6</sub> and Cystathionine γ-lyase Cystathionine gives cysteine. Taurine and sulphate are the products formed by the addition of cysteine and B<sub>6</sub>.

Taurine act as antioxidant, neuro transmitter and responsible for fat digestion. Sulphate converted the toxins to sulphate derivative and excreted in urine. Cysteine with aminoacids glutamine, glycine, minerals magnesium and potassium forms Glutathione. This glutathione plays major role in regulating blood pressure, oxidative stress control, maintain bioavailability of NO, reactive aldehydes at low level, insulin and glucose metabolism.

**Table.1** Cysteine and methionine containing plants and their parts used for analysis

S.No	Local Name	Botanical name	Parts used for analyzed
1	Murungai	Moringa oleifera	Leaves, flowers
2	Ellu	Sesamum Indicum	Seeds, Leaves
3	Sunflower	Helianthus annus	Seeds
4	Pumpkin	Cucurbita maxima	Seeds, leaves
5	Coconut	cocosnucifera	Seeds
6	Cashew	Anacardium occidentale	Seeds
7	soyabeans	Glycine max	Seeds
8	Onion	Allium cepa	Bulb
9	Garlic	Allium sativum	Bulb
10	Cabbage	Brassica oleracea	Leaves

Nowadays 70% of people in world affected mostly common diseases like sugar, blood pressure and heart attack and spent lot of money for recover from those diseases with health side effects. Instead of taking too much medicine for each disease, by taking balanced nutrition food, the diseases can be prevented or controlled without side effects. The plant foods are easily available in low cost for all kinds of people.

Without food there is no life

Without food there is no hope

Without food there is no society and no future. Food is basic and food is essential.

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