Biological perk for optimum health: Chlorella

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Abstract

Since ancient time chlorella is used as an alternative medicine, in far East. It is a green cellular freshwater microalga and is widely sold as a food supplement, health supplement and nutraceutical due to its content full of nutrients and having more efficacious effects. There are various species of chlorella found like Chlorella vulgaris, Chlorella pyrenoidosa, Chlorella protothecoidis amongst which C. vulgaris and C. pyrenoidosa are not considered in EU but C. protothecoides was recognised as safe under USFDA. Chlorella is rich in proteins, vitamins, minerals, and dietary fibres and labelled as SUPERFOOD, it includes benefits in boosting antibody count, promoting weight loss, improving immune system health, in detoxification of body and fighting with Cancer Side Effects as it has antioxidant activity. Irrespective of its hard shell it has a high nutritive value, inorder to digest it has to be taken as supplement to reap its benefit

Keywords: Chlorella, detoxification, food supplement, nutraceutical

Introduction

Algae are considered as the vast and the diverse group of organism ranging from single celled microalgae to the form of algae grow in sea and in the form of kelp. Nowadays micro algae are promoted as Superfoods and marketed majorly in dietary supplements. These are tempeted to sell as a virtue to cure-alls, to improve cardiovascular, gastrointestinal, cognitive and immunological health etc. also they reduces the skin wrinkling and the signs of ageing.

One of the most best algae classified under green algae is chlorella. Also one of the blue green algae classified by the biologist was the spirulina. Some of the spirulina and chlorella supplements contains good amount of vitamin c and k and beta carotene also contain plant sterols, omega-3 fatty acid (for anti-inflammatory properties)

To improve the blood cholesterol level and because of the antioxidant property the chlorella and spirulina are promoted. According to the Nutritional journal in 2014 on the basis of small clinal trail for the cholesterol was done over the people suffering from mildly elevated cholesterol took chlorella tablet after every meal for about four weeks had shown reduction in the total cholesterol and triglycerides compared with the people taking placebo

Spirulina

It is a blue-green algae. It is a non-toxic species of bacteria often used as a vegan source of protein and vitamin B12. It can improve the lipid and glucose metabolism also reduces the liver fat and protecting the heart. The main ingredient present in the spirulina that makes about 1% is phycocyanobilin. This compound mimics the bilirubin compound present in the body inhibiting nicotinamide adenine dinucleotide phosphate (NADPH) oxidase. By inhibiting NADPH oxidase it provides potent anti-oxidant and anti-inflammatory effects

Several health benefits:

- Anti-cancer properties
- Reduces blood pressure
- Anti-oxidant and anti-inflammatory
- Lowers triglycerides
- Improves symptoms of allergic rhiinitis
- Effective against anemia
- Improves muscle strength and endurance
- Aid blood sugar control

Chlorella

It is native to the Taiwan and japan, naturally rich in protein, vitamins, minerals and dietary fibres. There are various species or types of chlorella each having different nutritional quality. Supplements are marketed in the form of tablets, powders, or liquid extracts. The most practical benefit of chlorella is it grows quickly but it contains a tough cell wall that makes it...
Chlorella is grown in fresh water and the whole plant is used to make nutritional supplement and medicine. It is processed and made into tablets and liquid extracts and these extracts contain “chlorella growth factor” described as water soluble extract of chlorella containing chemicals including amino acids, peptides, vitamins, sugars and nucleic acid [3]. It has been found that dried preparation of it may contain 88% protein, 6-38% carbohydrate, 7-75% fat. It is a good source of proteins, fats, carbohydrates, chlorophyll, vitamins, minerals. Possibly it is effective for iron deficiency during pregnancy, taking chlorella might reduce the risk of anemia caused by too little iron in the body in the pregnant women [9].

Chlorella Growth Factor

Chlorella is to extremely rich in some of the most hard-to-gel nutrients, like vitamin B12, zinc, essential for supporting neurotransmitter level and proper functioning of brain, the nervous system, immune system and other body processes [6]. It is the major detoxifier of heavy metals, chemicals and raditions by binding to the toxins. Chlorella is also rich in prebiotic fiber this fiber is indigestible and allows food and fuel for the good probiotic bacteria in your gut, causing them to multiply rapidly and exponentially.

King of Superfoods

Chlorella is often called as “king of superfoods” it quadruples its number in every 20-24 hours. While consuming the chlorella it supplies in large amount the chlorella growth factor that provides raw nucleotide and peptides that helps the cell to protect, regenerate DNA and RNA. Normally the body manufactures this by their own but when supplied by CGF body utilises it and frees up extra energy to the cells for other biological processes required to amplify the health [5].

Ageing is due to the free radicle and oxidative stress damage, chlorella exerts its protective effect against them and reduces ageing but in elders the already damaged cells are present so it exhibits bioremedial effect (works to repair damaged part of cellular DNA from inside out). Chlorella is to extremely rich in some of the most hard-to-gel nutrients, like vitamin B12, zinc, essential for supporting neurotransmitter level and proper functioning of brain, the nervous system, immune system and other body processes [6].

Chlorella from the slant grown are transferred to the outdoor and the growth is continued in a concrete pool agitation through stirrers is done continuously) (Seed culture). Now it is being transferred to the larger flasks (Flask culture). Indoor grown are transferred to the outdoor and the growth is continued in a concrete pool with constant stirring in order to let sunlight hitting the whole batch evenly. Water used is the groundwater which is clean and free from contamination, low in hardness. Cultivation under the natural environment makes chlorella rich in vitamin B12 (Main culture).

Culturing

The seed stock (chlorella) is transferred to slant medium light and optimum temperature conditions are given simultaneously (Slanted culture). Chlorella from the slant culture is transferred to flat flask containing liquid, light and air with the amount of carbon-dioxide is supplied simultaneously and these are allowed to grow through simple process of photosynthesis. When the concentration of growth is increased it is transferred to the larger flasks (Flask culture). Indoor grown are transferred to the outdoor and the growth is continued in a concrete pool agitation through stirrers is done continuously) (Seed culture). Now it is being transferred to 36-46m diameter concrete pool with constant stirring in order to let sunlight hitting the whole batch evenly. Water used is the groundwater which is clean and free from contamination, low in hardness. Cultivation under the natural environment makes chlorella rich in vitamin B12 (Main culture).

Filtration, Dehydration

Culturing is over after reaching the desired concentration. Filtration is done to remove the appearing contaminants and is dehydrated repeatedly in a centrifuge and is washed, then filtered again and is concentrated.

Precautions during

- Iodine sensitivity.
- Immunodeficiency.
- Allergy to molds.

Difference between Spirulina and Chlorella

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Spirulina</th>
<th>Chlorella</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structure</td>
<td>Multi-celled (no distinctive nucleus)</td>
<td>Single celled (with nucleus)</td>
</tr>
<tr>
<td>Color</td>
<td>Blue-green algae</td>
<td>Green algae</td>
</tr>
<tr>
<td>Nucleic acid</td>
<td>In some amount</td>
<td>More than spirulina</td>
</tr>
<tr>
<td>Digestibility</td>
<td>Can be consumed easily after harvest</td>
<td>Requires number of processing</td>
</tr>
<tr>
<td>Chlorophyll content</td>
<td>Medium</td>
<td>Higher</td>
</tr>
<tr>
<td>Iron, protein</td>
<td>Higher</td>
<td>Medium</td>
</tr>
<tr>
<td>Heavy metals</td>
<td>It cannot bind to heavy metals</td>
<td>Its cell wall have unique property of binding with heavy metals.</td>
</tr>
</tbody>
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Side Effects and Safty

Common side effects include:
- Diarrhea
- Nausea
- Flatulence
- Green discoloration of stool
- Stomach cramping
- It also makes skin more sensitive against sun.
Cell Wall Pulverization
The digestibility of chlorella is not so good due to its tough cell wall. It is been resolved by pulverization method. A machine called Dyno Mill can be used to physically crush the tough cell wall.

Sterilization
Chlorella contains an enzyme Chlorophyllase, to deactivate this enzyme and for sterilization steam is mixed with chlorella slurry and a high temperature is maintained for short time.

Conclusion
On earth’s sea and freshwater there are about 23000 species of algae available. Chlorella is known as the micro algae and is having many biological perks for optimum health and well being. It is full of bioactive substances. It increases the resistance level and also prevents the premature ageing, reduces body fat percentage and contains further more health benefit. It is an important whole grain food supplement that should be included as a key component in a healthy diet.

References