

Empowering wellness through phytopharmaceuticals: Antioxidants and their role in lifestyle disease prevention



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Abstract

Phytopharmaceuticals hold immense potential for India, especially as many natural products and plant-derived compounds are already integrated into daily diets through foods like vegetables, fruits, and herbs. Common dietary items such as turmeric, ginger, and garlic, as well as leafy greens, pulses, and spices, are not only rich in nutrients but also possess antioxidant properties that contribute to overall wellness and disease prevention. Although many people use these natural products regularly, there is still a lack of awareness, and many misunderstand their real health benefits and healing power. Phytopharmaceuticals have demonstrated effectiveness in reducing the risk of certain diseases by combating oxidative stress and supporting immune health. There is a need for greater public awareness on the effective and scientifically-backed use of phytopharmaceuticals, which could serve as preventive healthcare measures in reducing lifestyle-related diseases. By addressing myths and encouraging informed consumption, India can leverage its rich biodiversity and traditional knowledge to enhance public health outcomes and foster a sustainable approach to wellness.

Keywords: Phytopharmaceuticals, Antioxidant, Disease, Benefits, Healthcare

1. Introduction

Phytopharmaceuticals, derived from plants, play a crucial role in promoting health and preventing diseases (1). The increasing awareness of their antioxidant properties has led many people to incorporate various fruits and vegetables into their daily diets (2). Antioxidants are substances that help prevent or delay the oxidation process in our bodies, which can cause cell damage and contribute to chronic diseases (1-3). Common sources of antioxidants include fruits like berries, vegetables such as spinach and lettuce, and herbs like turmeric and ginger (2). Research indicates that only a small percentage of the population understands the appropriate quantities of fruits and vegetables to consume daily. For optimal health, adults are generally advised to include at least 400 grams of fruits and vegetables in their meals each day. This can be achieved by consuming a variety of colorful foods, as each color often represents different beneficial compounds (3,4).

Timing also plays a significant role in maximizing the health benefits of these foods (2). Consuming fruits and vegetables at specific times, such as having a fruit smoothie in the morning or a salad with lunch, can enhance their antioxidant effects and improve overall well-being. For instance, eating vegetables during lunch can help in digestion, while having fruits as snacks can satisfy cravings and provide essential nutrients (5,6). Currently, there is a pressing need to educate the public about the importance

of phytopharmaceuticals. By increasing awareness, we can empower individuals to make healthier choices that may reduce the risk of lifestyle diseases such as diabetes, heart disease, and certain types of cancer (7,8). Initiatives aimed at promoting the consumption of fruits and vegetables, along with understanding their antioxidant properties, will be key to improving public health outcomes in India (2).

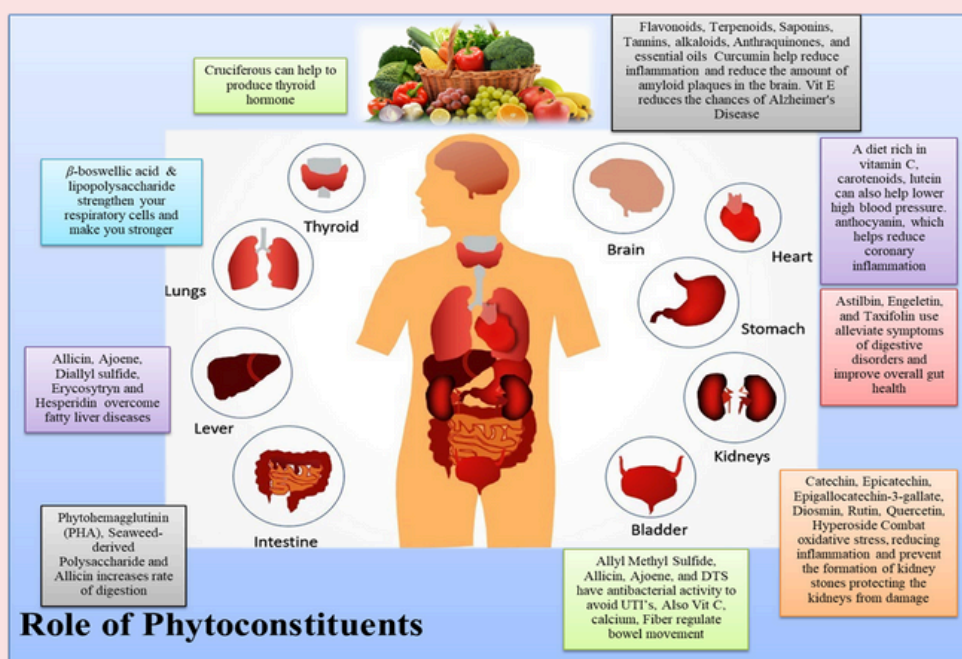


Figure 1. Role of Phytoconstituent

2. Phytoconstituents

Phytoconstituents from natural sources like vegetables, fruits, spices, and herbs provide potent antioxidant effects that can help prevent lifestyle diseases. Here are key phytoconstituents, with recommendations for age-appropriate intake, health benefits, and consumption patterns (8).

2.1. Curcumin

Curcumin is found primarily in turmeric, offers significant anti-inflammatory and antioxidant effects, supporting liver, joint, and heart health by neutralizing free radicals and inhibiting inflammatory enzymes (9). The European Food Safety Authority says that the safe daily amount of curcumin is between 0 and 3 mg for every kilogram of body weight. This is about 0 to 1.4 mg for each pound of body weight. To meet this requirement, children should consume 1/4 teaspoon daily, adults should have 1/2 teaspoon, and the elderly can take up to 1 teaspoon, along with black pepper to improve absorption (10,11).

2.2. Quercetin

Quercetin is present in apples, onions, and berries, has powerful antioxidant and anti-inflammatory properties that protect cells from oxidative stress, improve heart health, and reduce allergy symptoms by stabilizing histamine-releasing cells (12). Quercetin, the most common flavonoid in the diet, is typically consumed in amounts of 10–100 mg per day from foods like onions, apples, grapes, berries, broccoli, citrus fruits, cherries, green tea, coffee, red wine, and capers. Children can achieve this by eating a quarter of an apple or a small handful of berries, while adults and seniors can benefit from one whole apple or a small serving of berries. For best results, consume these fruits fresh (13).

2.3. Resveratrol

Resveratrol is found in grapes, blueberries, and peanuts, supports cardiovascular and brain health by reducing oxidative stress and activating enzymes linked to longevity (11). Clinical trials indicate that resveratrol is generally safe at doses up to 1g. However, consuming more than 2.5g per day may cause abdominal issues, including cramps, gas, and nausea. Children can get this benefit from 3-4 grapes or a few blueberries, while adults can have a small bowl and seniors the same portion. For optimal results, it's best to consume these fresh (13).

2.4. Catechins

Catechins are abundant in tea, green tea, enhance metabolism and heart health by scavenging free radicals and reducing LDL cholesterol oxidation (14,15). The average daily intake of catechins was 50 mg. As age increased, so did catechin consumption, with women having a higher intake (60 mg/day) compared to men (40 mg/day). Tea served as the primary source of catechins across all age groups. Green tea is good for older children and adults. Adults can have 1-2 cups daily, and seniors should have one cup. It works best when steeped in hot (not boiling) water, and adding lemon juice can increase its benefits (13,14,16).

2.5. Lycopene

Lycopene is present in tomatoes and watermelon, reduces cancer risks and supports heart health, particularly by protecting skin and prostate cells and DNA from oxidative damage (17,18). The recommended daily intake of lycopene is up to 30 mg, which is considered safe. For children, this can be achieved by consuming 1/4 cup of tomato-based foods, while adults and seniors should aim for 1/2 cup. Cooking these foods helps enhance the bioavailability of lycopene (14,17).

2.6. Vitamin C

Vitamin C from citrus fruits and bell peppers, supports immunity, collagen production, and iron absorption while protecting skin health (16). Children can have half an orange or a quarter of a bell pepper. Adults and seniors can also benefit from one medium orange or half a cup of bell peppers each day, preferably eaten fresh to maximize their nutritional value. This portion provides the average recommended daily intake of 50 mg (19).

2.7. Beta-carotene

Beta carotene is found in carrots and sweet potatoes, converts to vitamin A in the body, benefiting vision, immunity, and skin health (20). Recommended servings are a few carrot sticks for children and 1/2 cup for adults and seniors, providing 12-16mg per day. It's best to have them lightly steamed or roasted to improve absorption (21).

2.8. Anthocyanins

Anthocyanins are abundant in berries, provide anti-inflammatory and brain-health benefits by neutralizing harmful oxidants, potentially reducing cognitive decline. A small portion of berries each day is appropriate for all age groups and is most beneficial when consumed fresh. This will meet the daily intake of ACNs is estimated to be 12.5 mg/day/person (22-24).

2.9. Allicin

Allicin is present in garlic, offers antibacterial properties and supports cardiovascular health by reducing blood pressure and cholesterol levels (25,26). Small children may avoid it because of its strong taste, but older children, adults, and seniors can have one clove daily, while seniors can take 1-2 cloves. This provides the needed 0.1mg daily dose, preferably eaten raw, as cooking lowers its allicin content (27,28). Finally, flavonoids in citrus fruits, apples, and onions promote heart health by reducing inflammation and oxidative stress. Children can consume a quarter of an orange or a few apple slices, while adults and seniors should have one orange or apple daily. This food will accomplish 10-15mg daily dose (29-31).

Table 1. List of Phytoconstituent, Source, dose and mode of action (9-31)

Phytoconstituent	Sources	Daily Dose	Mechanism of Action
Curcumin	Turmeric	Children: 1/4 tsp; Adults: 1/2 tsp; Seniors: 1 tsp (with black pepper)	Neutralizes free radicals; inhibits inflammatory enzymes, supporting liver and joint health

Quercetin	Apples, Onions, Berries	Children: 1/4 apple or few berries; Adults & Seniors: 1 apple or small berry serving	Stabilizes histamine cells, reducing oxidative stress and inflammation; supports heart health
Resveratrol	Grapes, Blueberries, Peanuts	Children: 3-4 grapes or a few blueberries; Adults & Seniors: small bowl	Activates longevity enzymes, reduces oxidative stress; supports cardiovascular and brain health
Catechins	Green tea	Teens & Adults: 1-2 cups; Seniors: 1 cup	Scavenges free radicals, reduces LDL oxidation, supporting heart and metabolic health
Lycopene	Tomatoes, Watermelon	Children: 1/4 cup; Adults & Seniors: 1/2 cup (cooked for better absorption)	Neutralizes free radicals; protects skin and prostate cells, reducing cancer risks
Vitamin C	Citrus fruits, Bell peppers	Children: 1/2 orange or 1/4 bell pepper; Adults & Seniors: 1 orange or 1/2 bell pepper	Boosts immune function and collagen production; enhances iron absorption and skin health
Beta-Carotene	Carrots, Sweet potatoes	Children: few carrot sticks; Adults & Seniors: 1/2 cup (steamed or roasted)	Converts to vitamin A, supporting vision, skin, and immune health; neutralizes free radicals
Anthocyanins	Berries (e.g., Blueberries)	All ages: Small handful	Reduces inflammation, supports brain function, protects cells from oxidative damage
Allicin	Garlic	Older children, Adults & Seniors: 1-2 cloves (raw preferred)	Reduces blood pressure and cholesterol; prevents platelet aggregation, supporting heart health
Flavonoids	Citrus fruits, Apples, Onions	Children: 1/4 orange or few apple slices; Adults & Seniors: 1 orange or apple	

3. Marketed preparation

For those who find it difficult to meet their daily nutritional needs through food alone, various marketed supplements can help fulfill the requirements for essential phytoconstituents like curcumin, quercetin, and resveratrol (27). These supplements are available in several forms, including tablets, capsules, powders, and soft gels, making them easy to incorporate into daily routines. For example, curcumin supplements, often combined with black pepper extract (piperine) to improve absorption, are available as capsules or tablets and are typically taken orally once or twice a day (26). Quercetin supplements, often combined with vitamin C to enhance effectiveness, are available in tablet or capsule form and are usually taken with meals to improve absorption. Similarly, resveratrol supplements, available in capsule form, are often recommended as a daily dose to support heart and brain health. By choosing these convenient supplement forms, individuals can more easily meet their daily intake of key antioxidants and support their overall health, even on days when a balanced diet is challenging (31).

4. Conclusion

Phytopharmaceuticals are powerful natural remedies that help prevent lifestyle diseases with their strong antioxidant and anti-inflammatory effects. Foods like turmeric, berries, and green tea contain

these beneficial compounds, supporting heart, brain, and immune health. For those who cannot meet their daily nutritional needs through food alone, supplements in forms like capsules and powders can be a helpful option. By spreading awareness about these plant-based nutrients, people in India can make informed choices that improve their health and wellness.

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