

Cucumis Sativus: A Review

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Abstract

The family Cucurbitaceae includes the cucumber (*Cucumis sativus* L.). 30 species of *Cucumis* are distributed in Africa and Asia. One of the first vegetables to be farmed, cucumbers are native to the tropics. It has almost 3,000 years of historical documentation (Yawalkar, 1985). Widespread cultivation of *Cucumis sativus* (CS) is found in Bangladesh (including the Chittagong Hill Tracts, Gazipur, Sherpur, Cox's Bazar, Tangail, and other forests), the Indian subcontinent, and Sri Lanka. Cucumbers are said to have originated in the region that is now mostly occupied by Bangladesh, in the foothills of the Himalayas, north of the Bay of Bengal. Its use in Ayurveda involves stinging feeling, enlarged eyes, burns, dermatitis, anuria, skin whitening, emollient, and moisturizing. Children's dysentery is treated with raw, ripe fruit in China and India. Another powerful anthelmintic is the cucumber plant. Frontal headaches and sleeplessness can both be treated with seed oil. The main compounds in plants that carry out different functions include flavonoids, glycosides, and tannins.

Keywords: *Cucumis sativus*, phenolics, antioxidant, antidiabetic, Carotene

INTRODUCTION

As a result of this area is home to most of the recognized medicinal plants worldwide. The resources used to prepare medicine were plants, plant parts, and plant products; these medicinal plants and plant parts are a significant source of natural riches for a nation [1]. Considering herbal remedies have been used for a very long time in many different cultures, they are generally thought to be safe. The entire herbal market in the world is valued at 62.0 billion dollars [2]. With 45% of the global herbal market, the European Union holds the largest market share, with India contributing just \$1 billion. Being fed organically, cucumbers produce more and better because they are heavy users of organic materials. If there are essential element deficiencies in the soil, a balanced fertilizer should be applied. A minimum of 5% nitrogen and around 20% of organic elements, such as dried blood, pulverized cottonseed, dehydrated manures, bone, and fish should be included in this meal. Additional disorders, such as pitta, hyperdipsia, fever, sleeplessness, cephalgia, bronchitis, jaundice, hemorrhages, strangury [3], and general debility are also treated with it. Additionally, a plethora of academic publications have demonstrated the fruit extracts' anthelmintic, anti-diabetic, anti-ulcer, moisturizing, and antibacterial properties at varying dosages. The pulp and seeds of cucumbers are used as a folk remedy for skin

conditions like hyperpigmentation and to clean the face. In addition, *C. sativus* is still widely suggested for use in the cosmetics business today, having been used for centuries. As demonstrated by the diverse pharmacological activity and toxicities of its many sections, every plant, including the wise *Cucumis sativus*, has several phytoconstituents [4]. Because it contained chemicals that have therapeutic potential, it also exhibited a wide range of pharmaceutical action. Cucumber fruit is mostly composed of water; roughly 96% of the edible, unpeeled fruit is water. *Cucumis sativus* is also said to include vitamins, minerals, amino acids, phytosterols, phenolic acids, fatty acids, and cucurbitacin, according to a source. Cucumbers are

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said to include trace levels of vitamin C, amino acids, pectins, carbs, sugars, and essential oils [5]. The following substances were found in a water-soluble extract of cucumber fruit: glycosides, triterpenoids, flavonoids, carbs, and tannins. Fruits are used as a hair tonic, to treat cirrhosis bronchitis, asthma, dyspepsia, piles, diarrhea, coughing, hoarseness of voice, and eye diseases. They are also astringent, laxative, anthelmintic, and antipyretic. The green fruit's preparation is used to alleviate coughs. Fruit pulp assists with piles, dysenteric diarrhea, leprosy, and dropsy. Half-ripe fruit is used as a purgative. There are drug-like kernels in the fruit. Fruits are utilized in Khagrachari medicine to cure menstrual problems. A treatment for rheumatism is seed oil [6]. Bark gum has a purgative and soothing effect. The fruits contain a triterpenoid that exhibits strong antibacterial properties. Mice that were given kernel oil for an extended period tolerated it well and it had purgative effects.

PHYTOCHEMICALS

- *Carotene*: These phytochemicals are found in large amounts in tomatoes and pumpkins and have antioxidant qualities [7]. They give fruits and vegetables their colors – yellow, red, and orange.
- *Anthocyanins*: Plants include a set of pigments that are deep red, purple, and blue in color. They belong to a class of polyphenols that give many plants their color.
- *Polyphenols*: These are derived from the phenol molecule, which is made up of six carbon atoms bonded together in a ring configuration. They comprise the broad categories of stilbenes, phenolic acids [8].
- *Phenolics*: These are examples of metabolites called secondary metabolites which develop after the breakdown of phenylpropanoid in pentose phosphate and the shikimic acid of plants. most plant tissues [9], particularly those of fruits and vegetables, like thyme and rosemary, contain them.

Uses

This vegetable has extremely few calories but high-water content. Strong antioxidant, anti-diabetic, and antilipidemic properties are seen in it. It is frequently added to fermented pickles or salads. Antioxidant chemicals that are consumed through food play a major role in protecting human health, and the Mediterranean diet, which is high in natural antioxidants, is well known to prevent cancer and cardiovascular disease [10]. Fruit contains extremely little proteins (0.6%), lipids (0.1%), and carbs (2.2%), and its main components are made up of water (95%) and fats. Different types of *C. sativus* seedlings were found to have cotyledons containing Cucurbitacin's A, B, C, D, E, and I. These are the causes of the bitter taste in fruits. This fruit hydrolyzes to a non-bitter state upon maturity. Cucumbers seem to have different levels of bitterness from year to year and from place to place. This could be because specific environmental conditions, such as cool temperatures, can increase or decrease the formation of elaterase, which in turn can increase the bitterness of fruit [11]. Another study reveals that cucurbitacin C, which gives cucumbers their bitter taste, is present in very small amounts (0.001 mg). It is traditional to cut the fruit's stem ends off before using it since the stem contains more cucurbitacin C than the fruit's core or bloom end.

PHARMACOLOGICAL PROPERTIES

Anti-Cancer

The anticancer potential of *C. sativus* fruit methanol and acetone extracts were assessed. The findings showed that the fruit of *C. sativus* exhibited a high concentration of bioactive chemicals with anticancer activity when tested on IC50 cell lines (MCF 714.5 ± 1.3 and HeLa 26.1 ± 1). *C. sativus* cucurbitacin's inhibited cell proliferation [12], prevented migration and invasion, promoted apoptosis, and promoted cell cycle arrest, among other methods of action, to operate as an anticancer agent. The Wnt, PI3K/Akt, JAK-STAT3, and MAPK pathways were among the signaling pathways that curcumins also blocked. The survival and apoptosis of cancer cells are significantly influenced by those signaling pathways. Combining cucurbitacins with chemotherapeutic medications (such as methotrexate and docetaxel) can have synergistic anticancer effects.

Antioxidant

The antioxidant activity of *C. sativus* fruit was assessed using the superoxide radical scavenging assay and the 2,2-diphenyl-1-picrylhydrazyl (DPPH) method, which employed butylated

hydroxytoluene as a reference. In comparison to butylated hydroxytoluene [13], which had IC₅₀ values of 31.37 ± 1.42 and 51.78 ± 1.04 $\mu\text{g/ml}$, Significant DPPH free radical and superoxide radical scavenging activity was shown by *C. sativus* fruit extract, with IP values consisting of 14.71 ± 1.41 and 35.29 ± 1.30 $\mu\text{g/ml}$. In fruit, nonphenolic substances such uracil and methylene cycloartenol show strong antioxidant activity.

Anti-Diabetic

Male mice were given an ethanolic extract of *C. sativus* peels at doses of 250 and 500 mg/kg for 15 days to observe changes in hepatic lipid peroxidation (LPO) and blood glucose levels. The study's findings indicated that an ethanol extract of *C. sativus* peels might control the changes in the thyroid hormone and blood lipid levels that were caused by alloxan-induced diabetes mellitus [14]. The 500 mg/kg dose was tried for improved effects. Rats with streptozotocin-induced diabetes were used to test the antidiabetic potential of an aqueous extract of *Cucumis trigonus* fruit. The outcome showed statistical data that showed a significant drop in blood glucose, serum triglycerides, total cholesterol, and glycosylated hemoglobin levels and a rise in serum insulin level.

Anti-Inflammatory

Two dosages (150 and 250 mg/kg bw) of the methanolic extract of *C. sativus* leaves were found to exhibit anti-inflammatory action in the Long Evans rat model. The standard indomethacin (10 mg/kg bw) was used to compare the effects [15–17]. The outcome demonstrated that, in comparison to conventional medication (78.41%), Studies conducted on endothelial cells have demonstrated that *C. sativus* extract can reduce the inflammatory response triggered by lipopolysaccharide [15]. Additionally, the aqueous fraction of *C. sativus* may lessen inflammatory factors caused by Angiotensin II. By preventing sialidase from producing functionally active HA sticky CD44, iminosugar idoBR1, an iminosugar amino acid derived from *C. sativus* fruit, may have anti-inflammatory properties.

Anti-Bacterial

Cucumis sativus potency is an antibacterial against four microbiological illnesses in humans. The diffusion technique using agar wells was employed to conduct the antibacterial assay [18]. At a particular dose of seed extract, the highest zone of inhibition against *S. aureus* was observed. Each one of these pathogens, safeguards for *P. aeruginosa*, has been identified and *E. coli*, have been identified [16], were more susceptible to the extract of methanol. In final analysis, they concluded the potential for broad-spectrum antibacterial activity was present in CS seeds.

CONCLUSIONS

The study indicated that the *Cucumis sativus* has the potential to be an excellent substitute for the present generation of synthetic anti-inflammatory medicines. It may be used as an adjunct to artificial anti-inflammatory medications, with the potential to eliminate side effects, reduce total costs, and mitigate drug resistance. It acts as antioxidants. So, it shows a high level of pharmacological properties for control of disorders. *Cucumis sativus* showed potent actions over a broad range of parameters, indicating the presence of molecules with a wide range of activity.

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