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Exploring The Skin Benefit Properties Of *Camellia Sinensis And Cucumis Sativus*

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Abstract
Camellia sinensis (Green tea) comes in family Theaceace. This green tea widely shown in China, Southern Asia, Japan and in India. Its chemical composition consist various skin beneficial effect. It contains polyphenol mainly which is responsible for anti oxidant activity other chemical compounds are caffeine, carbohydrates, amino acid, and inorganic material. The major polyphenol in green tea are flavonoids. Major flavonoids are Catechins, epicatechin (EC), epigallocatechin gallate (EGCG), epicatechin gallate (EG), epigallocatechin (EGC). It has many effective property like Anti inflammatory, Anti oxidant, Neuroprotective effect, Anti microbial effect, Reducing skin redness and swelling. EGCG present in more quantity than other. ***Cucumis sativus*** *(*Cucumber) comes in family Cucurbitaceae. This cucumber is widely shown in India, West Indies, Himalayas, China. It is seasonal vegetable crop. It contain important chemical like α linolenic acid, β amyrin Caffeic acid, Citrulline, Cucurbitin A, Cucurbitin B, Ferullic acid, Albumin. It has many effective property like Antioxidant property, as Emollient, Moisturizer, Skin whitening, swollen eyes, anti wrinkle activity, Soothing effect and help in reduce dark circle.

Keywords: - *Camellia sinensis, Cucumis sativus,* Skin benefit property, Chemical constituents, Traditional uses.

INTRODUCTION

All living organism have a skin wheather they consist of single cell or multiple organ. Skin play important role in protecting and supporting the life it enclose [1]. The integumentary system is formed by the skin and its appendages that originate from the epidermis, such as hair follicles, sweat glands, sebaceous glands, nails, and mammary glands. Histologically, the skin is composed of two primary layers: the dermis and the epidermis. Deep within the dermis is a subcutaneous fascia known as the hypodermis. The epidermis is composed of three distinct and less common cell types, as well as four to five layers of keratinocytes. The epidermis is supported by the dermis. Beneath the dermis is a looser layer of connective tissue called the hypodermis. Its border is indistinct as it merges with the dermis the mucous membranes of the digestive system, the breathing system (nose), urogenital system, conjunctiva of the eyelids, external auditory meatus of the ear, and the external surface of the eardrum are all joined by the skin, which covers the entire external surface of the body [2].

Camellia sinensis

Camellia sinensis (Green tea) under the species of Evergreen angiosperm dicot plant [3]. It can be divided into three types on basis of fermentation i.e. Black tea 9 fermented), oolong (partially fermented) and last Green tea (unfermented)[4].Green tea also known as Chinese tea in different place. Green tea belong to family Theaceace [5].These are naturally low-growing, bushy plants, standing at around 3 to 4 feet [6]. It is originated from china [7].Green tea is most popular in East Asia (China and Japan). it is found in Thailand, Southern china, Western part of Assam, Australia, India, Himalayas,Srilanka[8].The main chemical which gives most health benefits is different polyphenolic compound (phenolic acid,flavonoids,flavonols)[9]. Green tea have so many health an skin benefits property like Antioxidants, protect skin from uv light and have photo protective nature and help to prevent from skin disorder like photoageing,melanoma skin cancer[10]. It has Anti carcinogenic property, Anti fungal property [11]. Green tea contain polyphenol help in potential effect in inhibiting tooth decay, help in reducing blood pressure,neuroprotective property, photoageing, antimicrobial, anti-inflammatory [12,13].

Cucumis sativus

Cucumis sativus L. (cucumber) is a yearly dicotyledonous plant from the Cucumis genus within the Cucurbitaceae family. It is a significant vegetable crop valued for its nutritional, dietary, and therapeutic benefits, making it a common ingredient in both the food and medicinal industries [14, 15, 16].
This crop is grown best in almost every country within temperate regions. As a heat-loving and frost- sensitive plant, it thrives best in temperature exceeding 20^0C [17]. Some important chemical are present like α linolenic acid, β amyrin Ferullic acid[18].They are categorized as berries which is available in different size, shape and colors. They are stubby little fruits about to 10-12 cm [19]. It is one of the most economically significant crop [20, 21].

Cucumber is indigenous to India and was domesticated in Asia approximately 3000 years ago. Cucumber can be categorized into three types: wild *(C.sativus L.var. hardwickii*), semi wild (*C. sativus L. var*. *xishuangbannanensis*), and cultivated cucumber (*C.sativus L. var. sativus*) [22]. Cucumber fruits in both their immature and mature forms whether raw or processed and uses as vegetable or sweets are widely consumed around the world [23]. Cucumber classified as a vegetable crop is abundant in polyphenolics and cucurbitacins, compounds known for their diverse biological activities, including amylolytic, anti microbial, diuretic, antihyaluronidase [24]. It has antioxidant and anti-inflammatory properties [25,26].They are act as moisturizer, skin whitening, emollient and act as Antiwrinkle property, Wound healing property and applied tropically for swollen eyes and as softening agent[18].

Table no.1 Plant profile *Cucumis sativus* [25]

Botanical name	*Cucumis sativusLinn.*
Kingdom	Planate
Division	Mangoliophyta
Class	Mangoliopsida
Order	Cucurbitales
Family	Cucurbitaceae
Genus	Cucumis
Species	C.*sativus*

Table no.2 Vernacular name [25]

English	Cucumber
Chinese	Huang Gua
Hindi	Kheera
Marathi	Tavsini
Malayalam	Vellari
Sanskrit	Sakusa

Figure1: ***Cucumis sativus linn.*** [27]

Table no.3 *Camellia sinensis* [28]

Kingdom	Plantae
Order	Ericales
Family	Theaceace
Genus	*Camellia*
Species	*C. sinensis*
Binomial name	*Camellia sinensis (L.)*

Table no.4 Common name of *Camellia sinensis* [28]

India	Chha
China	Cha
Russia	Chai
Africa	Itye
Italy	Te
England	Tea plant
United State	Tea

Figure2: *Camellia sinensis linn.* [29]

Geography

Camellia sinensis

Camellia sinensis(L.) Is extensively grown in tropical and subtropical mountainous regions across more than 50 countries and territories worldwide [29]. Green tea is evergreen plant that thrives mainly in tropical and temperate region of Asia, particularly in countries like China, India, Sri Lanka and Japan. It is also grown in various parts of Africa and South America. It is small shrub that cans up to 30 feet high but it is trimmed to 2-5 feet when cultivated for leaves [31].Green tea originates from china. The Camellia genus comprises over 90 species that are distributed from Nepal to Taiwan and Japan in the East Asia. It is found in Vietnam, Assam, Laos, Cambodia, Bangladesh, Kenya, and Malaysia [6].

Cucumis sativus

A large group of vegetable crops is extensively cultivated in subtropical and tropical region. This family includes 118 genera and 825 species. The plants within this family offer a variety of therapeutic and nutritional benefits [32]. Cucumber is widely cultivated around the world as a seasonal vegetable crop. Originating from India, it is found growing wild in the Himalayas, from Kumaun to Sikkim, and is cultivated across the country under various local names. The genus *Cucumis* consists of two types of subgenera. The first subgenus originated in the African region, while the other developed in the Asian region [33].

Chemical Composition

Camellia sinensis (L.)

Green tea primarily consists of polyphenol, caffeine, amino acid and other nitrogenous compounds, vitamins, inorganic elements, carbohydrate and lipids. The infusion primarily contains polyphenol, caffeine, theanine, vitamin etc. carbohydrates is the major constituents of tea leaf that includes cellulosic fiber and the next is protein, but these components are not soluble [34]. Fresh tea leaves are particularly abundant in Catechins a type of flavanol that can make up as much as 30 % of the leaf dry weight. Additionally they can contain other polyphenol like flavonoids and their glycosides as well as despised such as chlorogenic acid, coumaryiquinic acid, and theogallin (3-galloylqinic acid), which is unique to tea. The leaves also have an average caffeine content of around 3 % along with trace amounts of other methylxanthines including theobromine and theophylline [35]. The green tea contain protein whose enzyme constituent; amino acid like theanine, glutamic acid, tryptophan, glycine, and serine. And having mineral and trace element such as calcium, chromium, aluminum, iron, copper. Vitamins (B,C,E), xanthic base (caffeine, theophylline). Carbohydrates; cellulose, fructose, glucose and sucrose [36].

Polyphenol: The taste of green tea is bitter and astringent due to polyphenol content. The green tea have 6 kinds of Catechins: the Catechins which found in more amount is (-)-EGCG and other are (-)-EGC, (-)-ECG, and (-)-EC are present in decreasing amounts. The minor components are (+)-GC and (+)-C. Among these Catechins, (-)-ECG and (-)-EGCG, being ester types, are more bitter and have a stronger astringent effect compared to (-)-EC and (-)-EGC [34]. Catechins have gained significant attention due to their crucial roles in antioxidant, antibacterial, antitumor and antiviral properties [37].

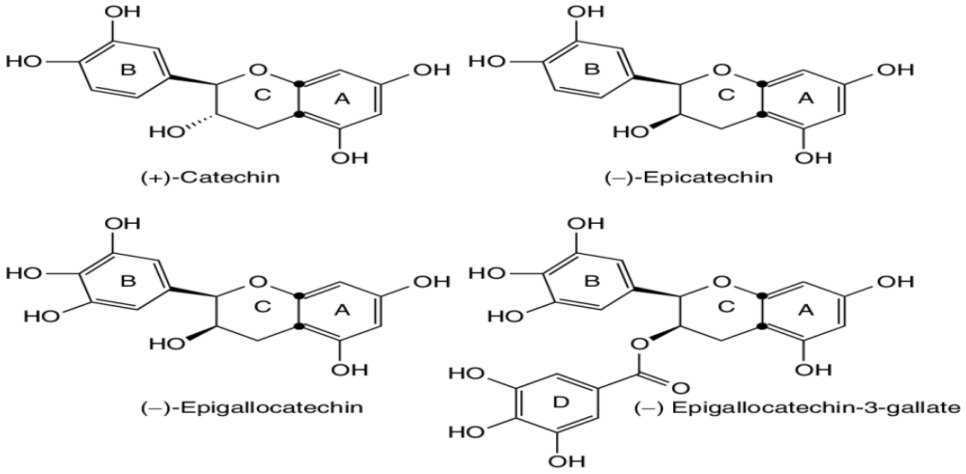

Figure: 3 structure of Catechins [38]

Cucumis sativus

The chemical composition includes polyphenol, phenol, flavonoids, glycosides, tannins, saponins, terpenoids, reducing sugar [39]. Volatile present in cucumber are divided in 3 types 1) terpenoids generated by methylerythritol phosphate or mevalonic acid. 2) Alcohols or aldehydes produced from unsaturated fatty acid and amino acids. 3) phenyl-propanoids or benzenes produced from aromatic amino acids [40]. The fruits contain chemical like α linolenic acid, β amyrin, Caffeic acid, Cucurbitin A,B,C and E, Ferullic acid. Dry seed contain Butyric acid, Cucurbitins, Sermidine. Seeds contain Albumins, Malate synthase, catalase [18].

Pharmacological properties

Camellia sinensis (L.)

1) Skin protective effect

UVB wavelengths ranging from 280 to 320 nm can contribute to skin cancer. It may lead to premature aging of skin cell [41].collagen cross-linked with polyphenol is protected from UV damage. Psoriasis characterized by excessive proliferation and abnormal differentiation of epidermal keratinocytes, results in flaky skin. Applying an ointment with 0.5% green tea polyphenol can help reduce flakiness [42]. When EGCG and epicatechin gallate (ECG) are treated with tannase, their free radical scavenging abilities improve. Tannase-treated Catechins inhibit collagenase and elastase activity, thereby aiding in the maintenance of skin elasticity [43].

2) Dental caries

Green tea leaves contain high amount concentration of fluorides, which contribute towards its cariostatic action along with rest component present in tea .green tea extract have inhibitory effects on oral pathogen to prevent tooth decay. The polyphenol in green tea have protective properties against tooth decay.ECG and EGCG are the most potent Catechins they significantly inhibit glucosyl transferase, which help prevent bacteria from adhering to tooth enamel. Catechins on daily basis can effectively help in reduce dental carries and use of green tea extract herbal mouthwash reduces the acidity of saliva [6].

3) Antidiabetic activity

Green tea has been shown to have antidiabetic properties. It reduced blood glucose levels in diabetic mice without altering insulin levels. Long-term consumption of green tea extract improved insulin sensitivity in normal rats. Additionally, when given to rats fed fructose, green tea extract helped prevent the onset of insulin resistance, high blood sugar, and other metabolic issues [28].

4) Green tea for skin treatment

Applying green tea polyphenol to the skin has been shown to influence biochemical pathways related to inflammation, cell growth, and responses to chemical tumor promoters and UV-induced skin inflammation. In mouse studies, topical EGCG treatment helps prevent UVB-induced immunosuppression and oxidative stress. However, the protective effects of green tea on human skin—whether applied topically or ingested—against UV-induced inflammation and cancer are not fully understood. Despite extensive evidence of green tea's benefits in

mouse models and limited research in humans, many pharmaceutical and cosmetic companies are adding green tea extracts to their skincare products. Studies using pooled human keratinocytes have shown that EGCG can reactivate skin cells approaching the end of their lifespan. Normally, these cells, which move toward the skin's surface, live for about 28 days and begin to prepare for shedding around day 20. The presence of EGCG appears to affect this process, potentially benefiting skin cell health. Current research seems to show that EGCG reactivates epidermis cells [4].

5) Prevent from skin cancer
Epigallocatechin gallate (EGCG) main polyphenol in green tea. Scientific studies suggest that EGCG in green tea have anti-inflammatory and anti cancer properties that may help prevent the onset growth of tumors [5, 44].

6) Antioxidant effect
Green tea possess strong antioxidant activity. It can use in many skin formulations [45]. It contains polyphenol called Catechins. Catechins are antioxidants that help prevent cell damage and provide other health benefits [46]

7) Green tea around the eyes
If there swelling around the eyes, green tea home remedy for puffy eyes may provide relief [47].

Cucumis sativus
Cucumber eating in daily basis can beneficial in many way like improve hair growth and soothe skin, reduce swelling of eye. Cucumber juice has potential to enhance skin texture and cures skin infection. Boiled cucumber leaves and cumin seed roasted powder can be used for throat infection. Keeping cucumber slices on the eyes relaxes our eyes and reduces puffiness around eyes. It also has eye soothner activities [48].

1) Antioxidant activity
The study demonstrates that yellow color cucumber extracts exhibit higher antioxidant activity compared to other varieties. Although yellow cucumber is typically used in dishes like Sambar rather than salads, the findings suggest incorporating it into salads to benefit from its rich antioxidant content. Free radicals are known to contribute to various diseases, and the results from in vitro antioxidant assays revealed that all three cucumber varieties show significant antioxidant activity. This activity is likely due to the presence of compounds such as carotenoids, phenolic flavonoids, tannins, polyphenols, and lycopene [32] .

2) Health beneficial values
For proper functioning of cardiovascular system the three nutrition that cucumber containing are magnesium, potassium and vitamin K . Potassium and magnesium help in lower the blood pressure. If we eat cucumber on daily basis it has been found that it help in decrease bad cholesterol and blood sugar level. Applying cucumber juice to the skin can make it soft and radiant. Cucumber helps with hydration, supports blood pressure regulation, and soothes the skin, while also aiding in digestion [49].

3) Wound healing property
The wound healing potential of cream formulation containing an aqueous extract of Cucumis sativus L. fruit was investigated on experimentally induced wounds in rats. The findings indicated that its antioxidant properties, along with the flavonoids content in C. sativus, contributed to faster wound contraction and increased epithelialization in the healing process in Wistar rats. Additionally, cucumber fruit extract has been shown to assist in the recovery from corneal acid burns [51].

4) Antibacterial activity [50]
5) Anti fungal activity [50]
6) Anti ulcer property [50]

Conclusions

In conclusion, green tea and cucumber emerge as potent agents with diverse and complementary benefits for health and skincare. Green tea and cucumber have so many health benefits since ancient time their beneficial aspects are scientifically proven. They are medicinal important plant and having so many pharmacological properties. Green tea's high concentration of antioxidants, such as Catechins and polyphenols, plays a crucial role in combating oxidative stress, enhancing cardiovascular health, and supporting metabolic processes, antioxidant, dental carries. Cucumber also has chemicals like α linolenic acid Cucurbitin A, B, C and Caffeic acid. Cucumber, known for its hydrating and anti-inflammatory properties, provides soothing relief to the skin, supports digestive health and help in reduce puffiness. Together, these natural ingredients offer a holistic approach to wellness, potentially improving skin appearance and overall vitality. Future research could further elucidate their

combined effects and explore innovative applications in health and cosmetic products. As scientific understanding and technology advance, the integration of green tea and cucumber could lead to groundbreaking developments in promoting a healthier, more radiant lifestyle. Embracing these natural solutions not only enhances current practices but also paves the way for future advancements in holistic health.

References

1) Ruth k. Freinkel and David T. Woodley in The Biology Of The Skin; The Parthenon Publishing Group International publishers In Medicine, Science of Technology ,Newyork, pp 15.
2) Oktay Arda etal. "Basic histological structure and function of facial skin." *Clinics in Dermatology*. **2014**,32,3-13.
3) Agarwal U,Pathak D P, Bhutani R, Kapoor G, Kant R. "Review on camellia sinensis – Nature's Gift." *International journal of Pharmacognosy and Phytochemical Research*.**2017**, 9(8), 1119-1126.
4) V. R. SINIJA & H. N. MISHRA. "Green tea: Health benefits."*Journal of Nutritional & Environmental Medicine*. December **2008**,17(4), 232–242.
5) V. V. Chopade, Phatak, A. A. , Upaganlawar, A. B. , and Tankar, A. A. , " Green tea (camellia sinensis): Chemistry, Traditional, medicinal uses and its pharmacological activities – A review." *Pharmacognosy Review*, **2008**, vol. 2, no. 3, pp. 157-162.
6) Vyas Tarun ,Nagi Ravleen, Bhatia Archana, Bain Sandeep Kumar "Therapeutic effect of green tea as an antioxidant on oral health – A review" *journal of family medicine and primary care*, **2021**, 10(11),3998-4001.
7) Carmen Cabrera, Reyes Artacho, Rafael Gimenez "Beneficial Effect of Green Tea – A Review" *Journal of the American College of Nutrition*, may **2006** 25(2), 79-99.
8) Rishi Raj Shrivastava, Pradeep Pateriya, Mahendra Singh "Green tea –A short review" *International journal of indigenous herbs and drugs*, March **2018**,2(2),12-21.
9) Khatoon N "Benefits of green tea: a review" *Progress in chemical and Biological science*, **2023**, 4.
10) S. Jayakeerthana "Benefits of Green Tea: A Review" *Journal of pharmaceutical Science and research*, **2016, 8**(10), 1184-1187.
11) Sinija V R, Hari N Mishra "Green tea: health benefits" *Journal of nutritional & Environmental Medicine*, December **2008**, 17(4), 232-242.
12) Prasanth MI, Sivamaruthi BS, Chaiyasut C, Tencomnao T. "A Review of the Role of Green Tea (*Camellia sinensis*) in Antiphotoaging, Stress Resistance, Neuroprotection, and Autophagy". *Nutrients*. **2019** Feb,11(2),474
13) Karolina Chilicka, Alekandra M. Rogowska,Monika Rusztowicz,Renata Szygula,Antoniya Yanakieva,Binnaz Asanova and Slawomir Wilczynski "The effect of green tea (Camellia sinensis),Bamboo extract (Bambusa vulgaris) and Lactic acid on sebum production in young women with acne vulgaris using sonophoresis treatment" *Healthcare(Basel)*,April **2022**, 10(4),684.
14) Tsygankova VA, Andrusevich YaV, Shtompel OI, Kopich VM, Pilyo SG, Prokopenko VM, et al. " INTENSIFICATION OF VEGETATIVE GROWTH OF CUCUMBER BY DERIVATIVES OF [1,3]OXAZOLO[5,4-D]PYRIMIDINE AND N-SULFONYL SUBSTITUTED OF 1,3-OXAZOLE." *Research journal of life sciences, bioinformatics, Pharmaceutical and chemical science*.**2017** Dec,102.
15) Gelaye Y. "Cucumber (Cucumis sativus) production in Ethiopia: Trends, prospects and challenges: A review." *Cogent Food & Agriculture*. **2023** Jun, 9(1).
16) Taha N, Abdalla N, Bayoumi Y, El-Ramady H. "Management of Greenhouse Cucumber Production under Arid Environments: A Review". *Environment, Biodiversity and Soil Security*. **2020** Jun 27, 4,123-136.
17) T.Tatlioglu "13-Cucumber: Cucumis sativus L." *Genetic Improvements of vegetable crops*, **1993**, 197-234.
18) Pritesh Shah, Swati Dhande, Yadunath joshi, Vilasrao Kadam, "Review on Cucumis sativus (cucumber)". *Research J. Pharmacognosy and Phytochemistry*. **2013**, 5(2), 49-53.
19) Mallik J et al, Jony Mallik, Priyanka Das, Sourav Das. "PHARMACOLOGICAL ACTIVITY OF CUCUMIS SATIVUS L. – A COMPLETE OVERVIEW". *Asian Journal of Pharmaceutical Research and Development*. **2013** Jan, Vol. 1(1).
20) Aparna; Skarzyńska, A.; Pląder, W.; Pawełkowicz, M. "Impact of Climate Change on Regulation of Genes Involved in Sex Determination and Fruit Production in Cucumber". *Plants* **2023**, *12*, 2651.
21) Yujin He, Mingming Wei, Yanyan Yan, Chao Yu, Siqi Cheng etal. "Research advances in genetic mechanism of major cucumber diseases resistance". *Frontiers in plant science 13*, **2022**,862486.
22) Gen Che, Xiaolan Zhang "molecular basis of cucumber fruits domestication". *Current opinion in plant biology*. February **2019**, 47, Pages 38-46.
23) Li, J.; Cao, J.; Wang, C.; Hao, N.; Zhang, X.; Liu, M.; Wu, T. "Research Progress on the Leaf Morphology, Fruit Development and Plant Architecture of the Cucumber". *Plants,* **2022**, *11*, 2128.

24) Uthpala TG, Marapana RA, Lakmini KP, Wettimuny DC. "Nutritional bioactive compounds and health benefits of fresh and processed cucumber (Cucumis sativus L.)". *Journal of biotechnology*, **2020**.
25) Khan,Anayatullah,Mishara,Anuradha,Hasan,Syed,Misbahul,Usmani,Afreen,Ubaid,Mohd,Khan,Naimuddin and Saidueeahman,Mohd,"Biological and Medicinal application of Cucumis sativus Linn-review of current status with future possibilities*". Journal of complementary and integrative medicine,* **2022**, 19*(4)*, 843-854.
26) Zhang, Jie et al. "Characterization of Differences in the Composition and Content of Volatile Compounds in Cucumber Fruit." *Foods (Basel, Switzerland)* vol. 11, 8 1101.
27) https://sl.bing.net/kqhBJ2P4Da8
28) Parmar N, Rawat M, Kumar JV. "Camellia Sinensis (Green Tea): A Review". *Global Journal of Pharmacology*. **2012**, 6(2), 52–59.
29) https://sl.bing.net/b8tRKoJIrKK
30) Zhao Y, Zhao M, Zhang L, Wang C, Xu Y. "Predicting Possible Distribution of Tea (*Camellia sinensis* L.) Under Climate Change Scenarios Using MaxEnt Model in China". *Agriculture*. **2021**, 11(11), 1122.
31) S.P.J Namal senanayake. "Green tea extract: Chemistry anti oxidant properties and food application –A review". *Journal of functional foods*, October **2013**,5(4),1529-1541.
32) Saeed H, Waheed A. "A REVIEW ON CUCUMBER (Cucumis Sativus)". *International Journal of Technical Research & Science*.**2017** Jul, (VI), 402.
33) Pulok K Mukhrjee, Neelesh K.Neema, Niladri Maity, Birendra K.Sarkar, "Phytochemical and therapeutic potential of cucumber*". Fitoterapia* **2013**, 84,227-236.
34) Kar S, Saloni S, Sindhu. "Green Tea - Its Chemical Constituents and Health Benefits"*. International Journal of Engineering Research & Technology (IJERT).* **2016** Feb, 565.
35) Harold N. Graham. "Green tea composition consumption and polyphenol chemistry". *Preventive medicine*, May **1992**, 21(3), 334-350.
36) Sabu M.Chacko, Priya T.thambi, ramadasan kuttan, ikuo Nishigaki, "Effect of Green tea: A literature review*".* Chinese *Medicine*, **2010**, 51(3).
37) Y Komatsu etal. "Effect of ph and temperature on reaction kinetics of catechins in green tea infusion". *NII – electronics library service*, **1993**,57(6),907-910.
38) https://www.researchgate.net/publication/329974665/figure/fig1/AS:918044100526080@1595890178220/Chemical-structure-of-catechins.png
39) Mark – Maria Uzuazokaro Agatemor etal. "Phytochemical and proximate composition of cucumber (Cucumis sativus) fruits from Nsukka, Nigeria". *African journal of Biotechnology*, **2018, 17**(38), 1215-1219.
40) Zhang, Jie et al. "Characterization of Differences in the Composition and Content of Volatile Compounds in Cucumber Fruit." *Foods (Basel, Switzerland)*. April **2022**, vol. 11(8) 1101.
41) S Otake, M Makimura, etal. "Anticarries effect of polyphenolic compound from Japanese green tea". *S karger AG, Basel.1991, 25,438*-443.
42) Hsu S, Dickinson D, Borke J, Walsh DS, Wood J, Qin H, et al. "Green tea polyphenol induces caspase 14 in epidermal keratinocytes via MAPK pathways and reduces psoriasiform lesions in the flaky skin mouse model". *Experimental Dermatology*. **2007** Jul 6,16(8),678–84.
43) Yang-Hee hong, Eun young Jung, etal. "Original article physiological effect of formulation containing tannase converted green tea extract on skin care: physical stability, collagenase, elastase and tyrosinase activities". *Integrative Medicine Research*. March **2014**,3(1), 25-33.
44) Saeed M, Naveed M, Arif M, Kakar MU, Manzoor R, El-Hack MEA, et al. "Green tea (Camellia sinensis) and L-theanine: Medicinal values and beneficial applications in humans—A comprehensive review". *Biomedicine & Pharmacotherapy*. **2017** Sep6, 1260–1275.
45) Liao R, Parker T, Bellerose K, Vollmer D, Han X. "A Green Tea Containing Skincare System Improves Skin Health and Beauty in Adults: An Exploratory Controlled Clinical Study". *Cosmetics*. **2022**, 9(5), 96.
46) BSc KG and Dylan bailey. "10 Evidence-Based Benefits of Green Tea". *Healthline*. **2023**. Available from: https://www.healthline.com/nutrition/top-10-evidence-based-health-benefits-of-green-tea
47) Frothingham S. "Green Tea for Your Skin". *Healthline*. **2019**. Available from: https://www.healthline.com/health/benefits-of-green-tea-for-skin#takeaway
48) Chakraborty Shampa & Rayalu Sadhana. "Health Beneficial Effects of Cucumber". *Intechopen*. **2021**.
49) Mallick PK. "Evaluating Potential Importance of Cucumber (Cucumis sativus L. -Cucurbitaceae): A Brief Review". *International Journal of Applied Sciences and Biotechnology*. **2022** Mar 29, 10(1), 12–5.
50) Latha Kumaraswamy. "Cucumber-A Natural Medicine and its Therapeutic Potential". *Phytotherapeutics*, vol.4