Diabetic Green Tea Synthesis Using Nanomaterials (NMs) and its Resistance towards Pollution

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***Abstract*: Green tea is majority approved beverage which is globally manufactured from the leaves of plants that has esteem possible health welfares. They are accessible, marketable as antioxidative, antihypertensive, ant provocative. Moreover, this research about green tea also come up with the other components accommodated in the leaves and vegetal seasonings such as Anthocyanins, Polyphenols, linalool, Terpene and Pinene. These components presume broad scope of biological importance and fitness benefits together with anti-virus and antibacterial, anti-cancer and anti-intellect activities. This research focus primarily on the synthesis of catechin and Anthocyanins using Nanomaterials (NMs) and Nanotechnology. Green tea having Anthocyanins and catechin has an enhanced class of beverages and their Synthesis has been gaining attention in the field of medicine, pharmaceutical chemistry, cosmetic and textile industries.**

***Keywords*: Green tea, Anti-oxidants, Antibacterial, Anti-provocative, Antihypertensive, Catechin, Anthocyanins, Nanomaterials (NMs), Nanotechnologies.**

1. Introduction

Plants have long been used as conventional medication but now many physical well being are combating mankind significant destroyers. Vegetal seasonings(Herbal spices) have been securing recognition in research for their curative and health giving uses .Physical health and vegetal seasoning have an crucial correspondence that is used for many non identical method ,since ages analyst in all over the world are broadly studying prospective of these species and Herbs in numerous ailment and due to the high antioxidising quality**[1].** Nanotechnology is developing as a progressive experimentation with several implementation. It comprises of the substances and their applications having measurements in the range of 1–100 nm and are called Nanomaterials. Many chemical and physical conventions have made use of Nanomaterials (NMs) manufacturing. Hence ample studies are be in need of traverse in this area of spices basedobservation as novel Nano materials**[2].**

Greens methodology put an end to the use of costly synthesis, leads to absorb less energy and give rise to environmentally good natured products and by products. For eco-friendly synthesis the plant and herbal spices are extracted and their production methods are easy , feasible, ecofriendly and commercial. Blossom is an crucial slice of plants, and comprises of numerous chemicals such as flavonoids, terpenoids and xanthones which are used as an vital forefather for synthesis using Nanomaterials and nanotechnologies**[3].** These conventional methods used for NMs synthesis are considered as expensive, time consuming and hazardous to environment due to involvement of unsafe and toxic chemicals. Generally the main focus of this research is to make possible the latest production of green tea to be environmentally safe and acceptable it even shows application in various fields like biomedicines, pharmaceutics, catalysis, sensors, cosmetics, agriculture, textile products etc.

Green tea gives a huge variety of health benefits, constituting antiviral, antibacterial, and anti-inflammatory activities. It have also been determined to lessen the threat of cancer and enhanced intellectual operations,

it also shows immense effects regarding neurological short comings antianxiety, cardiovascular disease prevention, cholesterol reduction**[4].**

Green tea catechin and anthocyanidins has also shown characteristics to combat high blood pressure. Other qualities of green tea is that it fatal bacteria and viruses, reduces Increased blood sugar and Control diabetes**[5].**

In addition to put a stop to or rehabilitate these ordinary diseases, initial research specified that green tea (catechin , Anthocyanidins)may have some amazing results in Opposing AIDS. Laboratory tests have verified that catechin can inhibit the activity of the AIDS virus**[6].**

Human inhabitant extension, mechanization up to date and communal conduct shows the selection of recently developed microbial antibodies. Revealing contaminated diseases are created through formerly and unacknowledged pathogens. On moving through assessments of numbers researchers we evaluated data green tea can be handed down as and magnificent anti microbial negotiator**[7]**. Green tea withdrawn are immersed in several form such as coagulates ,lotion, creams and can be taken alone.

2. Results and Discussions

Generally green tea's are manufactured from plants , trees and their several parts , but mostly green tea used recently are products of advances in their Synthesis Using herbal spices along with Nanomaterials which shows resistance towards pollution.The ingredients adopted for the synthesis of the green tea are depicted in **Fig. (1)** ,(1) Basil Leaves,(2) Hibiscus leaves,(3) Dry ginger, (4) Cloves ,(5) Small Cardamom, (6) Cinnamon, (7) Mint leaves,(8) Dry Coriander (9) Guava Leaves and are further classified according to their Chemical Composition and Anti-Oxidant characteristics represented through the Table (1). The structural evaluations of (a)Menthol and Menthon, (b)Anthocyanins,(c)Phenolic acid and Flavonoids (d)Pinene ,(e) Caffeic acid (f) 1,8-cineole and Limonene is represented through **Fig.2** as

(a)Menthol and Menthone[8]:

Menthol is a covalent organic compound made synthetically or obtained from peppermint or other mint oils and. (-)-menthone is a menthone that is cyclohexanone substituted by a methyl and an isopropyl group at positions 5 and 2 respectively (the 2S,5R-stereoisomer),

(b)Anthocyanins [9]:

They are the glycosylated forms of anthocyanidins (aglycones). These compounds are formed by a flavylium cation backbone hydroxylated in different positions (generally on carbons C3, C5, C6, C7 and C3', C4′, C5′) to give rise to different anthocyanidins.

(c) Phenolicacid andFlavonoids[10] :

It consists of a basic five-carbon isoprene unit (2methyl-1,3-butadiene)

(d) Pinene and Terpenes[10]:

Generally they are composed of two, three, four, or six isoprene units.

(d) Caffeicacid[10]:

It is a phenolic compound synthesized by all plant species and is present in foods such as coffee, wine, tea, and popular medicines such as propolis.

(e) 1,8- Cineole and limonene[10] :

1,8-cineole is a natural monoterpene, also known as eucalyptol. It is a major compound of many plant essential oils, mainly extracted from Eucalyptus globulus oil.Limonene is a monoterpene that is cyclohex-1-ene substituted by a methyl group at position 1 and a prop-1-en-2-yl group at position 4 respectively. It has a role as a human metabolite.

Fig.1 : Ingredients for the Synthesis of green tea (Basil Leaves, Hibiscus leaves ,Dry ginger, Cloves ,Small Cardamom, Cinnamon, Mint leaves , Dry Coriander, Guava Leaves)

SERIAL NO. / NAME	CHEMICAL COMPOSITION	ANTI-OXIDANTS PRESENT
1. BASIL LEAVES	Methyl Cinnamate ,linalool Beta -elemene,Camphor	Lutein,Zeaxanthin,Beta-Carotene and Cryboxanthin
2.HIBISCUS LEAVE	Anthocyanins,Polyphenols, Protocatechuic acid and quercetin	Beta-Carotene,Vitamin -C, Anthocyanins
3. DRY GINGER	Phenolic (gingerols,shogaols), Terpene compound	6-gingerols
4.CLOVE	Eugenol,Beta-Caryophuyllene ,Alpha-humulene,Eugenyl acetate	Eugenol
5.SMALL CARDAMOM	1,8-cineole,Alpha -terpinyl acetate,Sabinene,Beta -linalool	Propanoids,Flavonoids, Terpenes
6. CINNAMON	Cinnamaldehyde,Cinnamic acid, Cinnamate	Procyanidins,Catechins
7. MINT LEAVES	Menthol ,menthone,(±)-methyl acetate1,8-cineole,Beta-pinene	Caffeic acid ,cinnamic ,ferulic and oleanolic acid
8.DRY CORIANDER	Linalool,Alpha-pinene,Terpinene, limonene,p-cymene	Beta-Carotene and Lutein
9. GUAVA LEAVES	Carbohydrates, Ascorbic & Gallic acid ,phenolic compounds	Quercetin,Gallic acid,Caffeic acid,Catechin

Table 1: Chemical Composition and Presence of Anti-oxidant

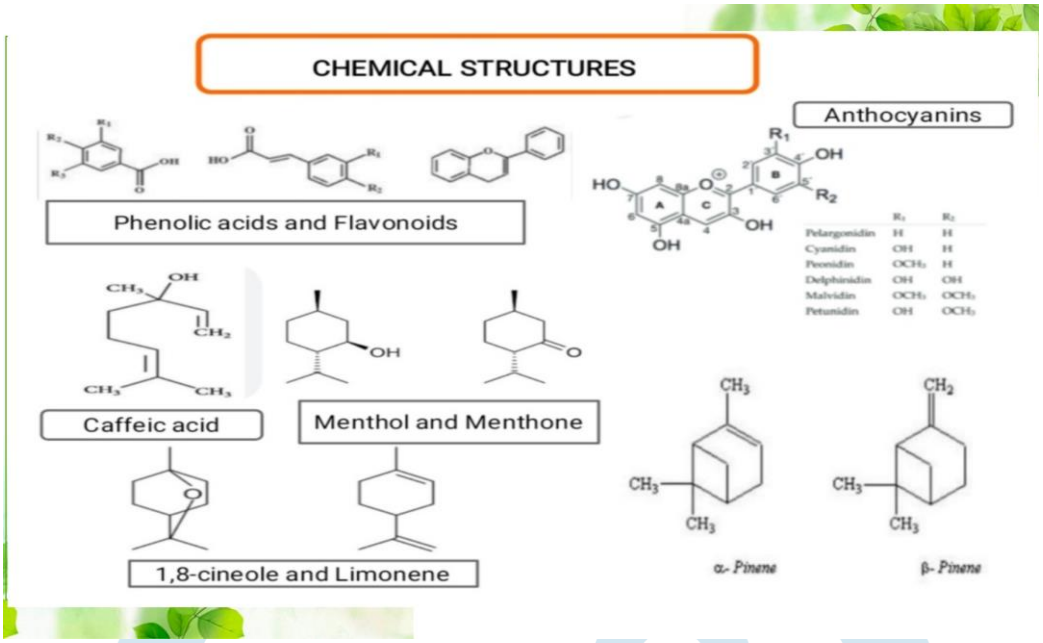

Fig.2: CHEMICAL STRUCTURE

3. CONCLUSION

There are numerous health benefits to everyone regarding the consumption of green tea. As this study carried Anti-microbial, Anti-oxidants and Anti – inflammatory Properties of plants and herbal species it may be concluded that green Tea is strong enough to prevent or cure most of the Microbial infections[**11**]. Naturally occurring catechins , linalool, lutein , polyphenols, vitamins , Carotene and Anthocyanins obtained from basil leaves, Hibiscus leaves,dry ginger, cloves, small cardamom, cinnamon, mint leaves and dry coriander ,Guava leaves have a wide range of prevention towards bacteria and the conventional anti-infective agents contained inside them are used for the Treatment of severe infections**[12].**

These Successive points call attention to the opposition of Green tea towards pollution [13]:

a. Green tea has a comparative little carbon footprint contrast to other food.

b. By decreasing pollution, you are additionally decreasing the quantity of energy that is being absorbed, there by creating path for a eco friendly and virtuous environment.

c.Composting one's pre- owned tea bags is a “green” method to get rid of them, with the attached interests of enhancing one's compost and sprinting up the decay putting on these to soil can also carry on its hydration extent and improves the well being of plants.

d. They disperses carbon dioxide and other toxins from the air hence clean the site up.

f. The green tea is often utilized as manure and fertilizer for plants

Till date, there has been few research available on the involvement of Nanomaterials for the synthesis of green teas. The present research paper highlights and elucidates the mechanistic role of Nanomaterials and reducing the availability of chemicals for synthesis of green teas**[14]** .

“Eventually, the present research also focuses the applications of synthesized Nanomaterials in various discipline of science also shows its pollution free characteristics” [15].

4. SYNTHESIS:

General information

Green teas are frequently mentioned as non- or unfermented teas. The main characteristics of green tea is that it is eminent from black and it’s leaves do not go through any procedure of fermentation, while the moderate operation of natural withering is exchanged by a quick one to get it worked up or sun drying[16]. The intension of this is to inactivate the stimulant and thereby put a stop to the process of fermentation. The

Conventional techniques of processing green teas contains withering (though not always), heating, rolling and drying**[17].** After plucking, the fresh leaves are spread out on bamboo trays and exposed to sunlight or warm air for 1-2 hours. Then the leaves are heated to put a stop to oxidation and preserve freshness. Lastly, the leaves are rolled into numerousshapes and then dried. The rolling also enhanced the execution of natural oils and flavor. last but not the least after complete drying ,the product was sorted and packed hence , available for consumption**[18].**

5. GENERAL PROCEDURE

The sequential procedure of green tea production are explained below:

1)Plucking[19]:

Tea leaves are extracted at the reaping period. For superiority one bud and two leaves are removed as this gives rich seasonings and flavors' . Plucking of the green leaves happen within one week from plant.

2)Withering[20]:

Withering is done by permitting the leaves to dry in standardize air. The stimulant present in leaves behave rapidly with oxygen, leads to wilting. Withering (sneering) is the procedure of detaching the wetness from leaves and to let them dried down for hours.

3) No Fermentation[20] :

In this ,the Oxidation came to an end for green tea process, conditioned on the kind of tea that is generated.

4)Fixation[21] :

Fixation is the procedure of the striking the oxidation in tea leaves. It's concludes to do their latent heating into sunlight without harming the leaves

5)Rolling[22]:

Leaves are shaped into long twirls through rolling by hands.

6)Drying[23] :

The terminating step of processing includes manufacturing the tea leaves. Rolled leaves are dried in a drier for panning. After this the tea is sorted, packed and ready to be consumed.

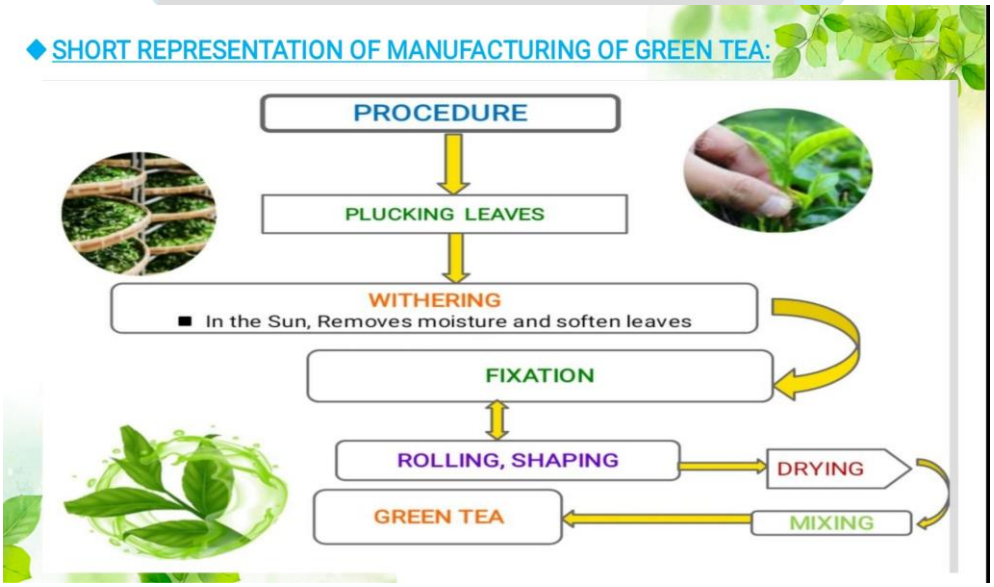

Fig.: 3 Short Representation of manufacturing of green tea.

6. EVALUTION OF ANTIMICROBIAL ACTIVITY OF GREEN TEA

Minimum bactericidal concentration (MBC), minimum fungicidal concentration (MFC) and minimum inhibitory concentration (MIC) assays were studied according to Clinical laboratory standards**.[24-28]***Candida albicans* ATCC 90023, *Staphylococcus aureus* ATCC 25923 and *Escherichia coli* ATCC 25922 were used as standard microorganisms. The concentrations of microorganisms were 1×10^8 CFU mL^{-1} for bacteria, 1×10^6 CFU mL^{-1} for yeast at 0.5 McFarland standard turbidity. MIC values were measured by preparing serial dilutions from standard concentration of extracts (12.5–200 μg mL^{-1}) and nanoflowers (1.25–20 μg mL^{-1}) by using Mueller Hinton broth (MHB) for bacteria and RPMI medium for fungus. Mueller Hinton agar (MHA) plates were used to measure MBC after 18 hours for bacteria. The MBC is defined as the minimum concentration at which there is a 3 log reduction in the CFU. The data were recorded as survival rates (CFU mL^{-1}), based on 100% survival for the untreated control. All MIC and MBC values were reported based on three experimental repeats indicating reproducibility of the obtained results. The minimum fungicidal concentration (MFC) of each sample required to kill 99% of the yeast cells was determined by spreading of 10 μL portions from each well with no growth on Sabouraud Dextrose Agar (SDA) plates**[29].**

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