



FREE RADICAL SCAVENGING EFFECT AND ALPHA-AMYLASE INHIBITORY EFFECT OF *SOLANUM MELONGENA* L. LEAVES

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ABSTRACT

The present study was undertaken to evaluate the antioxidant and antidiabetic potential of the aqueous alcoholic extract of Solanum melongena L. leaves. Solanum melongena L., commonly known as eggplant or brinjal, belongs to the family Solanaceae and is widely cultivated in tropical and subtropical regions. The leaves of the plant are known to be rich in bioactive phytochemicals such as flavonoids, alkaloids, phenolic compounds, and glycosides, which contribute to various pharmacological activities. In the present investigation, the leaves were collected, washed, dried, and subjected to Soxhlet extraction to obtain a crude aqueous alcoholic extract. Preliminary phytochemical screening confirmed the presence of carbohydrates, alkaloids, flavonoids, and glycosides. The antioxidant activity of the extract was evaluated using the Ferric Reducing Antioxidant Power (FRAP) assay, with ascorbic acid employed as the reference standard. The results indicated significant free radical scavenging activity, suggesting strong antioxidant potential of the leaf extract. The antidiabetic activity was assessed by determining the in-vitro α -amylase inhibitory effect using the dinitro salicylic acid (DNS) method. A maltose calibration curve was prepared, and the percentage inhibition of α -amylase was calculated. The extract exhibited a notable α -amylase inhibition of 53.84%, indicating its potential role in controlling postprandial hyperglycaemia. Overall, the findings of this study demonstrate that Solanum melongena L. leaves possess considerable antioxidant and antidiabetic activities, which may be attributed to their phytochemical constituents. Further studies focusing on the isolation, characterization, and quantitative analysis of active compounds are required to validate these effects and explore their potential in the development of novel therapeutic agents.

KEYWORDS: Solanum melongena L., Antioxidant activity, α -Amylase inhibition, Phytochemical screening, FRAP assay, Antidiabetic potential.

INTRODUCTION

Herbal medicine is increasingly embraced across the globe, in both emerging and developed nations, due to its natural source and minimal side effects. Numerous traditional remedies are sourced from medicinal plants. Herbal ingredients are favoured for their lower toxicity, reduced risk of adverse effects, cost-efficiency, and broader availability compared to conventional drugs.^[1] Plants that possess a diverse range of bioactive compounds are essential for maintaining human health and survival. The diversity of bioactive compounds with

distinct therapeutic potential contributes to their role in health systems, in addition to their function as a source of nutrients.^[2]

Herbal medicine, also known as phytomedicine, involves the use of plant parts such as leaves, roots, seeds, bark, and flowers for therapeutic purposes. In recent years, the use of herbal drugs has increased significantly in both developing and developed countries because of their natural origin and minimal side effects. India has a rich heritage of traditional medicine, with numerous

medicinal plants used for over a thousand years, particularly in rasayana formulations. The World Health Organization reports that approximately 21,000 plant species are used medicinally worldwide, of which about 2,500 are found in India, with nearly 150 species used commercially. Owing to this vast diversity, India is regarded as the “botanical garden of the world.”^[3]

Eggplant (*Solanum melongena*), also known as aubergine or brinjal, is a widely consumed fruit belonging to the family Solanaceae and holds significant economic and nutritional importance worldwide. It is predominantly cultivated in tropical and subtropical regions and is valued not only as a food crop but also for its medicinal properties. They are an important source of potent antioxidants, including nasunin and chlorogenic acid, which help reduce oxidative stress. The high flavonoid and phenolic content of eggplants contributes to their antimicrobial, antiviral, antimutagenic, and cardioprotective effects, and is associated with a reduced risk of chronic diseases. Along with related species such as *S. aethiopicum* and *S. macrocarpon*, *S. melongena* is widely utilized for both nutritional and therapeutic purposes across the globe.^[4]

Solanaceous vegetables are rich in bioactive compounds such as alkaloids, phenolics, antioxidants, and vitamins, which contribute to their medicinal and nutritional value. They are good sources of vitamins A, C, E, B-complex vitamins, minerals, and dietary fiber, helping prevent malnutrition. Potent antioxidants like lycopene in tomatoes and nasunin in eggplant reduce oxidative stress and lower the risk of chronic diseases. Brinjal contains chlorogenic acid and nasunin with anticancer, antidiabetic, and anti-obesity effects, while tomatoes, chilli, and capsicum provide phenolics and flavonoids that support cancer prevention, cardiovascular health, and immunity.^[5]

Phytochemical Investigation

Phytochemical analysis is the systematic study of naturally occurring chemical compounds present in plants, including flavonoids, alkaloids, glycosides, phenols, and saponins. It involves the identification, isolation, characterization, and quantification of these constituents.^[6]

Plants contain diverse classes of phytochemicals, including alkaloids, glycosides, flavonoids, phenolic compounds, terpenoids, saponins, tannins, steroids, proteins, and amino acids. The isolation, separation, and structural elucidation of these compounds are achieved using analytical techniques such as chromatography (TLC, HPLC, GC-MS), spectroscopy (UV-Vis, IR, NMR), and mass spectrometry. Phytochemical screening has wide applications in medicinal plant research, the pharmaceutical industry, cosmetics, food and beverage sectors, and agricultural sciences. Phytochemical analysis includes both qualitative tests to detect the

presence of compounds and quantitative methods to determine their concentration in plant materials.^[6]

Phytochemical Investigation of *Solanum melongena*.I leaves

Solanum melongena Linn. is a herbaceous plant characterized by coarsely lobed leaves, white to purple flowers, and berry-type fruits, widely cultivated for both nutritional and medicinal purposes. The plant contains important phytoconstituents such as flavonoids, tropane and glycoalkaloids, arginine, lanosterol, gramisterol, and aspartic acid. Pharmacological studies have reported its analgesic, antipyretic, antioxidant, anti-inflammatory, antiasthmatic, hypolipidemic, hypotensive, antiplatelet, intraocular pressure-reducing, CNS depressant, and anaphylactic reaction-inhibitory activities. Herbal medicine has been practiced since ancient times, and even today a large proportion of the global population relies on traditional plant-based remedies for primary health care.^[7]

Pharmacological Activities

1. Analgesic Activity

Vohora et al., 1984 tested the effect of crude alkaloidal fraction isolated from leaves of *Solanum melongena* on the central nervous system. It exhibited significant analgesic effect.

2. CNS Depressant Activity

Vohora et al., 1984 studied the effect of crude alkaloid fraction of *Solanum melongena* leaves on the central nervous system (CNS). The result showed that it has some CNS depressant activity.

3. Antipyretic Activity

Mutalik et al., 2003 evaluated the antipyretic effect of leaves of *Solanum melongena* at doses of 100 mg, 250 mg and 500 mg/kg body weight. It was found to produce significant antipyretic effect in a dose-dependant manner in yeast induced pyrexia in albino rats.

4. Spasmogenic Activity

Mans et al., 2004 studied the spasmogenic activity of methanolic extract of *Solanum melongena* leaves on guinea pig tracheal chains and its possible mechanisms of action using serial dilutions between 0.0025 and 2.5 mg/ml. It was found that the extract caused a dose dependant increase in the force of muscle contraction and concomitant use of histamine increased its spasmogenic action.^[7]

Introduction to Free radical scavenging effect

Free radical scavenging refers to the neutralization or inhibition of highly reactive, unstable molecules known as free radicals, which possess one or more unpaired electrons in their outermost shell. These free radicals cause tissue damage by abstracting electrons from nearby molecules, thereby disrupting their structural and functional integrity.^[9] Antioxidants are essential for maintaining physiological balance by neutralizing highly

reactive free radicals generated during normal metabolism or from external factors such as UV radiation and pollution. Uncontrolled free radicals can damage cellular components, DNA, and proteins, contributing to aging and diseases such as cancer and cardiovascular disorders. Antioxidants inhibit oxidative damage by donating electrons to stabilize free radicals and interrupt chain reactions. Common antioxidants include vitamins C and E, β -carotene, flavonoids, and polyphenols found in plant-based foods. In addition to free radical scavenging, antioxidants regulate cellular signaling, gene expression, and enzyme activity, thereby supporting overall health and disease prevention.^[10]

Mechanism

Free radical scavenging is a chemical process that neutralizes highly reactive free radicals possessing unpaired electrons, thereby preventing oxidative damage to essential cellular components such as DNA, proteins, lipids, and cell membranes. This protective mechanism reduces the steady-state concentration of free radicals and interrupts oxidative chain reactions. Free radical scavenging occurs through several chemical pathways, including hydrogen atom transfer (HAT), single electron transfer followed by proton transfer (SET-PT), and sequential proton loss electron transfer (SPLET). In the HAT mechanism, antioxidants donate a hydrogen atom directly to stabilize free radicals and effectively terminate chain reactions such as lipid peroxidation. The SET-PT pathway involves initial electron transfer from the antioxidant, followed by proton loss to stabilize the resulting species. In the SPLET mechanism, antioxidants undergo deprotonation before electron transfer, leading to radical neutralization.

Methods for the Determination of Antioxidant Activity

1. ORAC—Oxygen Radical Absorption Capacity
2. HORAC—Hydroxyl Radical Antioxidant Capacity
3. TRAP—Total Peroxyl Radical Trapping Antioxidant Parameter
4. CUPRAC—Cupric Reducing Antioxidant Power
5. FRAP—Ferric Reducing Antioxidant Power
6. PFRAP—potassium ferricyanide reducing power
7. ABTS—2,2'-Azinobis-(3-ethylbenzothiazoline-6-sulfonic acid
8. DPPH—[2,2-di(4-tert-octylphenyl)-1-picrylhydrazyl]^[10]

Introduction to α - Amylase Enzyme

Amylase is an enzyme that catalyzes the hydrolysis of starch and other complex carbohydrates into simpler sugars such as maltose and dextrins. In humans, it plays a key role in digestion by initiating carbohydrate breakdown in the mouth and continuing in the small intestine. Amylase is mainly produced by the salivary glands as salivary amylase (ptyalin) and by the pancreas as pancreatic amylase, facilitating efficient digestion and energy utilization from dietary starch. In addition to its physiological role, amylase is widely distributed in

animals, plants, and microorganisms and is extensively used in industrial applications, including brewing, baking, and biofuel production, for the conversion of starch into fermentable sugars.^[11]

Inhibition of α - Amylase Activity

α -Amylase is a key digestive enzyme responsible for the hydrolysis of starch into simpler sugars such as dextrins, maltotriose, maltose, and glucose. Carbohydrates are a major component of the human diet, with polysaccharides serving as an important energy source. During digestion, dietary carbohydrates are enzymatically broken down into monosaccharides, as only these forms can be absorbed from the intestinal lumen. Glucose, the primary absorbable monosaccharide, enters the bloodstream following the hydrolysis of glycosidic bonds in starch by enzymes such as α -amylase and β -glucosidase. Inhibition of these enzymes can effectively reduce postprandial blood glucose levels, making them important therapeutic targets in the management of diabetes mellitus.^[12]

MATERIALS AND METHODS

MATERIALS REQUIRED

Chemicals used

- Molisch's Reagent
- Conc. H_2SO_4
- Mayer's Reagent
- 2% NaOH
- Dilute HCl
- Pyridine
- Sodium Nitroprusside
- 20% NaOH
- 1% Gelatin Solution
- 0.2 M Phosphate Buffer
- 1% Potassium ferricyanide
- 10% Trichloroacetic acid
- 0.1% $FeCl_3$
- 0.1% Ascorbic acid
- 1% Starch Solution
- α - amylase enzyme solution
- DNS Reagent
- Maltose

Apparatus used

Soxhlet apparatus: Extraction chamber, Condenser, Round Bottom Flask (RBF)

Equipments used

- Colorimeter
- Weighing Machine
- Heating Mandle
- Centrifuge Machine

COLLECTION AND AUTHENTICATION

Fresh leaves of *Solanum melongena.L* collected from Hostel Garden and authenticated by Junior Scientific Officer, State Medicinal Plants Board, Kerala, Thrissur .

The collected leaves were dried in shade, crushed to coarse powder and used for further studies. The leaves picture is incorporated in figure-1. The collected leaves washed in running water to remove any organic or foreign particle if present. Dried in shade for 10 days and pulverized in mortar and pestle of the laboratory. The resultant powder was sieved to obtain a uniform particle sized crude drug.

$$\% \text{ yield} = \frac{\text{weight of dry extract}}{\text{weight of plant powder}} \times 100$$



Figure 4: Fresh leaves of *Solanum melongena*.



Figure 5: Dried Coarse Powder of *Solanum melongena*. Leaves.

EXTRACTION

Preparation Of Aqueous Alcoholic Extract (Soxhlation)

The dried plant material (the leaves of *Solanum melongena*.L 5.11g) was placed in a thimble. The thimble was placed in the extraction chamber, which was suspended above a flask containing the solvent (50ml Ethanol & 50ml of Distilled water respectively) and below a condenser. The flask was heated at 40°C for 6 hours and the solvent evaporated up into the condenser that trickled into extracting chamber containing the plant and the boiling flask. Then concentrated extract was kept in refrigerator 5°C for experimentation.



Figure 6: Soxhlet extraction.



Figure 7: Crude drug extract.

PHYTOCHEMICAL INVESTIGATION

❖ Test for Carbohydrates

Molisch's Test: Add 2-3 drops of Molisch's reagent to 2 ml of plant extract and Add few drops of Conc. H_2SO_4 slowly along the sides of the test tube.

Formation of Violet ring at the junction of two phases indicates the presence of the carbohydrates.^[13]

❖ Test for Alkaloids

Mayer's Test: Add 2-3 drops of Mayer's reagent to 1 ml of plant extract and shake the test tube.

Formation of yellowish white precipitate shows the presence of the alkaloids.^[14]

❖ Test for Flavonoids

Alkaline Reagent Test: To 1ml of plant extract add 3ml of 2% of NaOH, a deep yellow colour appears. Then add few drops of dilute HCl to it.

Deep yellow colour fades showing the presence of flavonoids¹⁵.

❖ Test for Glycosides

Legal's Test: The extract was dissolved in pyridine and sodium nitroprusside and add few drops of 20% NaOH solution.

Formation of Pink red to red colour indicates the presence of glycosides.^[16]

❖ Test for Tannins

Gelatin Test: Add few 2ml extract to the test tube and add few drops of 1% gelatin solution and mix.

Formation of white precipitate indicates the presence of tannins.^[17]



Figure 8: Chemical tests.

ANTIOXIDANT ACTIVITY OF SOLANUM MELONGENA LEAVES

Equipments used

1. Colorimeter

A Colorimeter is a device used in colorimetry that measures the absorbance of particular wavelenths of light by a specific solution. It is commonly used to determine the concentration of a known solute in a given solution by the application of the Beer-Lambert law, which states

that the concentration of a solute is proportional to the absorbance.^[18]



Figure 9: Colorimeter^[18]

2. Centrifuge Machine

A centrifuge is a device that uses centrifugal force to subject a specimen to a specified constant force – for example, to separate various components of a fluid. This is achieved by spinning the fluid at high speed within a container, thereby separating fluids of different densities (e.g., cream from milk) or liquids from solids. It works by causing denser substances and particles to move outward in the radial direction. At the same time, objects that are less dense are displaced and moved to the centre. In a laboratory centrifuge that uses sample tubes, the radial acceleration causes denser particles to settle to the bottom of the tube, while low-density substances rise to the top. A centrifuge can be a very effective filter that separates contaminants from the main body of fluid.^[19]



Figure 10: Centrifuge Machine.^[20]

MATERIALS AND METHOD USED

Ferric Reducing Power by FRAP Method

❖ Preparation of Reagents

- 0.2M phosphate buffer (pH 6.6): 8 g of sodium chloride, 0.2 g of potassium chloride, 1.44 g of

disodium hydrogen phosphate, 0.24 g of potassium dihydrogen phosphate was taken in a 1,000 mL standard flask and add 800 mL of distilled water and adjust the pH 6.6 using hydrochloric acid and adjust the volume with deionised water.

- Potassium ferricyanide (1%): 1 g of potassium ferricyanide was dissolved in 100 mL of deionised water.
- Trichloroacetic acid (10%): 10 g of trichloroacetic acid was dissolved in 100 mL of deionised water.
- Ferric chloride (0.1%): 100 mg of ferric chloride was dissolved in 100 mL of deionised water.
- Ascorbic acid (0.1%): 1 mg of ascorbic acid was dissolved in 1 mL of water²¹.

❖ Method

- Different concentrations of the aqueous alcoholic extract of *Solanum melongena* leaves and its various fractions (10-50 µg/mL) was added to 2.5 mL of 0.2 M sodium phosphate buffer (pH 6.6) and 2.5 mL of 1% potassium ferricyanide [K₃Fe(CN)₆] solution.
- The reaction mixture was vortexed well and then incubated at 50°C for 20 min using vortex shaker.
- At the end of the incubation, 2.5 mL of 10% trichloroacetic acid was added to the mixture and centrifuged at 3,000 rpm for 10 min.
- The supernatant (2.5 mL) was mixed with 2.5 mL of deionised water and 0.5 mL of 0.1% ferric chloride.
- The colored solution was read at 520 nm against the blank with reference to standard using UV Spectrophotometer.

Here, ascorbic acid was used as a reference standard, the reducing power of the samples were comparable with the reference standard.^[21]



Figure 11: Supernatant solution.

α- AMYLASE INHIBITORY ACTIVITY OF SOLANUM MELONGENA.L LEAVES

α-amylase inhibition by DNS method

Materials

Starch solution: Took 1 g of potato starch and dissolved in 100 ml of 0.02 M phosphate buffer (pH 7).

DNS reagent: It can be prepared by dissolve at room temperature 1 g of 3, 5- Di Nitro Salicylic Acid in 20 ml of 2N NaOH, add 50 ml of distilled water followed by 30 g of Rochelle Salt make the volume up to 100 ml with

distilled water. Protect this solution from CO₂ and store at 4°C.

α-amylase enzyme solution: Dissolve 6 mg of α-amylase in 200 ml of 0.2 M phosphate buffer (pH 7) containing 0.006 M NaCl. From this stock solution take 10 ml, dilute to 100 ml with same buffer solution. The final concentration of enzyme in the solution is 30 µg/ml.

Maltose standard solution: Dissolve 50 mg of maltose in 50 ml distilled water and store at 4°C. NaOH (4.5%): Weigh 4.5 g of NaOH, dissolve it in approximately 80 ml of distilled water, and make the volume up to 100 ml with distilled water.

NaOH (2N): Weigh 8 g NaOH, dissolve in approximately 80 ml distilled water, and the final volume up to 100 ml with distilled water.

Phosphate buffer (0.2 M, pH 7): Take 39 ml of 0.2 M. monobasic sodium phosphate solution and mix with 61ml of 0.2M dibasic sodium phosphate solution and dilute to a total volume of 200 ml.

Phosphate buffer (0.02 M, pH 7): Take 10 ml of the above phosphate buffer (0.2 M) and dilute it to 100 ml with distilled water.^[22]

Preparation of Maltose Calibration Curve

Pipette aliquots of 0.1 to 1.0 ml of maltose (100-1000 µg) solution into test tubes and make up the volume to 1ml with suitable addition of distilled water. To each tube add 2 ml of DNS reagent. Cover tubes with marbles. Keep the tubes in water bath for 10 minutes. Cool the tubes and add 10 ml of distilled water to each test tube. The orange red colour formed is measured at 540 nm against a reagent blank.

Determination of α-Amylase inhibitory activity

Pre-incubate the entire reagents for 15 minutes at 37° C in a water bath. Pipette 0.5 ml of 1% starch solution and add it to 0.25 ml of phosphate buffer (0.2M, pH 7) and 0.25 ml of α-amylase enzyme solution. Similarly, a second set of test tubes (blank) by using phosphate buffer in place of enzyme solution. Prepare a third set of test tubes containing 0.5 ml of starch solution, 2 ml of DNS reagent. 0.25 ml of α-amylase enzyme solution; this set is called the zero-time control. Incubate all the tubes at 37°C for three minutes. At the end of the incubation add 2 ml of DNS reagent to first and second set of tubes to stop the reaction and transfer all the tubes to water bath for 10 minutes. After cooling under cold water, add 10 ml of distilled water, mix thoroughly and take absorbance at 540 nm against the blank.^[22]

Liberated reducing sugars are expressed as maltose equivalent using the calibration curve. One unit of enzyme activity is defined as that amount which liberates 1 µmol of reducing sugars (calculated as maltose) /min from soluble starch at 37°C, pH 7, and. under the specified experimental condition.^[22]



Figure 12: Maltose solution test tubes series.

Preparation of extract and quantification of α -amylase inhibitory activity.

Weighed 1 g of the sample and extracted it with 75 ml of distilled water and 75 ml of ethanol for 2 hours at 40°C. Centrifuged the suspension at 5000 rpm and collected the supernatant. Took 0.25 ml of the supernatant and incubated it with 0.25 ml of enzyme solution for 15 minutes at 37°C. Ensured all reagents were also incubated at 37°C for 3 minutes. After incubation, added 2 ml of DNS reagent to the first, second, and sample tubes to stop the reaction. Transferred the tubes to a water bath for 10 minutes. After cooling with cold water, added 10 ml of distilled water and mixed thoroughly. Measured the absorbance at 540 nm, using the blank as a reference.^[22]

The released reducing sugars were expressed as maltose equivalents based on the calibration curve. One unit of enzyme activity was defined as the amount that liberated 1 μ mol of reducing sugars per minute from soluble starch at 37°C and pH 7, under the specified experimental conditions.^[22]

% Inhibition of α -Amylase

% Inhibitory activity = $(A - C)/(B - C) \times 100$

A = Absorbance of Sample

B = Absorbance of Blank

C = Absorbance of Control^[22]

RESULT

RESULTS FOR EXTRACTION PROCESS

Table 01: Result of Extraction process.

Sl.No	CHARACTERISTICS	EXTRACT
1	Colour	Green
2	Taste	Bitter
3	Odour	Bitter and Earthy aroma
4	Consistency	Hairy and Rough texture
5	%Yield	78%w/w

% yield of crude extract = $5.49/7 \times 100 = 78\% \text{ w/w}$

RESULTS FOR PHYTOCHEMICAL INVESTIGATION

Table 02: Result of Phytochemical investigation.

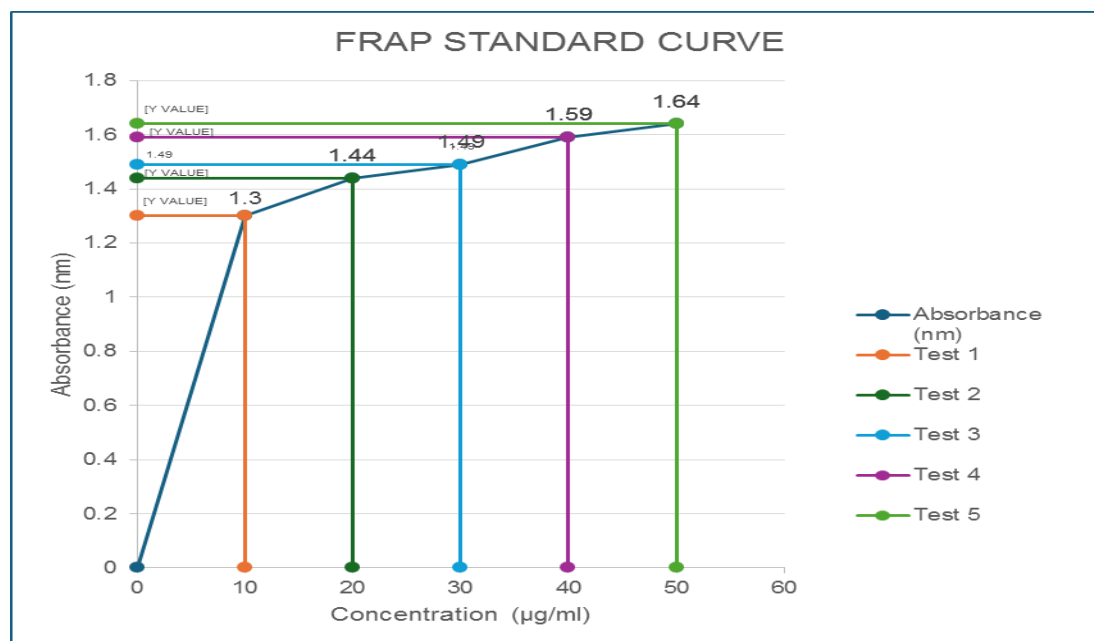
Sl.No	Chemical Test	+/-
1	Test for Carbohydrate	+
2	Test for Alkaloids	+
3	Test for Flavonoids	+
4	Test for Glycosides	+
5	Test for Tannins	-

RESULTS FOR FREE RADICAL SCAVENGING EFFECT

Table 03: Result of FRAP Method.

Sl.No	Concentration (μ g/ml)	Absorbance (520nm)
1	10	1.30
2	20	1.44
3	30	1.49
4	40	1.59
5	50	1.64

In this experiment, the yellow color changes to pale green color depending on the concentration of antioxidants in the samples, by comparing the reference standard Ascorbic acid (1) with plant extract is found to be greater, So the Free radical scavenging activity is more in *Solanum melongena.L* leaves.



Graph 01: FRAP Standard Curve.

RESULTS FOR α - AMYLASE INHIBITORY ACTIVITY

Table 04: Maltose calibration curve values.

Concentration (µg/ml)	Absorbance (540nm)
0	0
0.1	0.23
0.2	0.26
0.3	0.30
0.4	0.34
0.5	0.40
0.6	0.43
0.7	0.50
0.8	0.55
0.9	0.61
1.0	0.73

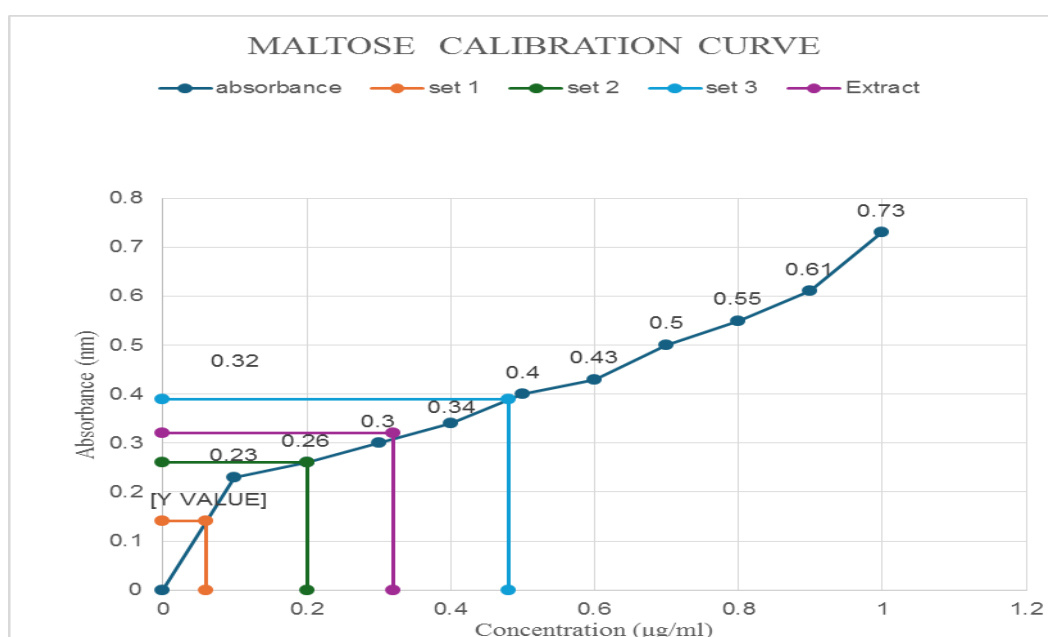


Table 05: Result of α - Amylase inhibitory activity detection.

Sample	Absorbance (540nm)
Set 1 (E+S)	0.14
Set 2 (blank)	0.26
Set 3 (E+S+DNS)	0.39
Extract (E+S+DNS)	0.32

Where,

E = Enzyme, S = Starch, DNS = Dinitro Salicylic Acid reagent

% Inhibition of α -Amylase

% Inhibitory activity = $(A - C)/(B - C) \times 100$

A = Absorbance of Sample

B = Absorbance of Blank

C = Absorbance of Control

% Inhibitory activity = $(0.32 - 0.39)/(0.26 - 0.39) \times 100$

= 53.84%

DISCUSSION

Free-radical Scavenging Effect of *Solanum melongena*.L Leaves by FRAP Method

The FRAP assay measures antioxidant activity based on a sample's ability to reduce ferric (Fe^{3+}) to ferrous (Fe^{2+}) ions, with absorbance at 520 nm proportional to antioxidant power. *Solanum melongena* L. leaves show significant free radical scavenging activity due to their rich content of flavonoids and phenolic compounds, which donate electrons to neutralize free radicals and reduce oxidative stress. Flavonoids, along with phenols, tannins, and alkaloids, contribute markedly to this antioxidant potential. Studies using FRAP and DPPH assays confirm these effects, supporting the therapeutic potential of eggplant leaves in managing oxidative stress-related conditions.

Alpha-Amylase Inhibitory Effect *Solanum melongena*.L Leaves by DNS Method

Alpha-amylase inhibitors reduce carbohydrate digestion into simple sugars, thereby decreasing glucose absorption and helping manage type 2 diabetes and related metabolic disorders. The DNS method is commonly used to assess reducing sugars and indirectly evaluate α -amylase activity. Using this method, *Solanum melongena* L. leaf extracts have demonstrated significant α -amylase inhibitory activity. This effect delays the breakdown of complex carbohydrates, reducing postprandial blood glucose spikes. The activity is mainly attributed to phenolic compounds such as chlorogenic acid and delphinidin, which also possess antioxidant properties. These findings suggest that eggplant leaf extracts may serve as a promising natural antidiabetic agent.

CONCLUSION

Solanum melongena L. (eggplant) leaves demonstrate significant antioxidant and antidiabetic potential. Phytochemical screening of the leaf extract confirmed the presence of bioactive constituents such as flavonoids, alkaloids, glycosides, and carbohydrates, which are known to contribute to free radical scavenging and enzyme inhibitory activities. The extract exhibited strong

free radical scavenging activity, surpassing the reference standard ascorbic acid, likely due to its high flavonoid content. In addition, the α -amylase inhibitory activity assessed by the DNS method showed 53.84% inhibition, indicating the ability of the extract to delay carbohydrate digestion and reduce postprandial blood glucose levels. These findings suggest that *Solanum melongena* L. leaves may serve as a promising natural source for managing oxidative stress and diabetes mellitus. Further studies focusing on isolation, characterization, mechanism of action, and formulation development of the active compounds are warranted to support their potential use in herbal drug development.

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