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Research

Preliminary Phytochemical Investigation, HPTLC Standardization and *in-vitro* Antidiabetic Activity of *Stachytarpheta Urticifolia* Leaf Ethanolic Extract

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Abstract:
Diabetes mellitus is a chronic metabolic disorder characterized by persistent hyperglycemia resulting from defects in insulin secretion, insulin action, or both. Despite the availability of several synthetic anti-diabetic agents, their long-term use is often associated with adverse effects and limitations, necessitating the search for safer and effective alternatives from natural sources. The present study was undertaken to evaluate the in vitro anti-diabetic potential of the ethanol extract of *Stachytarpheta urticifolia* leaves (EESU) by enzyme inhibition studies. Fresh leaves of *Stachytarpheta urticifolia* were collected, authenticated, dried, powdered, and successively extracted using petroleum ether, benzene, chloroform, ethanol, and water. Preliminary phytochemical screening was carried out using standard qualitative methods. Total phenolic content was estimated using the Folin–Ciocalteu reagent method, and HPTLC fingerprinting was performed for standardization of the ethanol extract using quercetin as the reference standard. The in vitro anti-diabetic activity of EESU was evaluated by assessing α-amylase and α-glucosidase inhibitory activities at different concentrations, with acarbose used as the standard drug. Phytochemical screening revealed the presence of alkaloids, flavonoids, glycosides, tannins, polyphenols, saponins, triterpenoids, and amino acids in the ethanol extract. Among all extracts, the ethanol extract showed the highest percentage yield (26.63% w/w) and the highest total phenolic content (254.66 ± 19.55). HPTLC analysis confirmed the presence of quercetin in the ethanol extract. EESU exhibited concentration-dependent inhibition of both α-amylase and α-glucosidase enzymes, with IC_{50} values of 269.88 µg/mL and 351.38 µg/mL, respectively, compared to acarbose with IC_{50} values of 27.49 µg/mL and 25.07 µg/mL. The findings of the present study suggest that the ethanol extract of *Stachytarpheta urticifolia* leaves possesses promising in vitro anti-diabetic activity, which may be attributed to its rich phytochemical composition, particularly phenolic compounds and flavonoids such as quercetin. Further in vivo and mechanistic studies are warranted to validate its therapeutic potential as a natural anti-diabetic agent.

Keywords: *Stachytarpheta urticifolia*; Anti-diabetic activity; α-Amylase inhibition; α-Glucosidase inhibition; Ethanol extract; Quercetin; HPTLC; Phenolic content

1. INTRODUCTION

Diabetes mellitus is one of the most prevalent chronic metabolic disorders worldwide and is a major cause of morbidity and mortality. It is characterized by elevated blood glucose levels resulting from impaired insulin secretion, decreased insulin sensitivity, or both. Persistent hyperglycemia is associated with long-term complications affecting the cardiovascular system, kidneys, eyes, and nervous system. The increasing global burden of diabetes has created an urgent need

for effective, safe, and affordable therapeutic interventions.

Although several synthetic oral hypoglycemic agents are available for the management of diabetes mellitus, their prolonged use is often associated with undesirable side effects such as gastrointestinal disturbances, hypoglycemia, weight gain, and other metabolic complications. Consequently, there is growing interest in the identification and development of plant-derived anti-diabetic agents that may offer improved safety profiles and multi-target therapeutic benefits.

Medicinal plants have long been used in traditional systems of medicine for the treatment of various metabolic disorders, including diabetes mellitus. The selection of plants based on ethnomedicinal use and subsequent scientific validation through modern pharmacological approaches has proven to be an effective strategy in natural product drug discovery.

Stachytarpheta urticifolia Sims, belonging to the family Verbenaceae, is a medicinal plant traditionally used in folk medicine for the treatment of fever, rheumatic inflammation, stomach disorders, ulcers, diarrhea, dysentery, and other ailments. Phytochemical studies have demonstrated the presence of bioactive constituents such as flavonoids, alkaloids, tannins, glycosides, saponins, terpenoids, steroids, and phenolic compounds in various parts of the plant. However, there is limited scientific evidence regarding its anti-diabetic potential, particularly through in vitro enzyme inhibition studies.

Inhibition of carbohydrate-hydrolyzing enzymes such as α-amylase and α-glucosidase is a well-established therapeutic strategy for controlling postprandial hyperglycemia. Therefore, the present study was designed to evaluate the in vitro anti-diabetic activity of the ethanol extract of *Stachytarpheta urticifolia* leaves (EESU) through α-amylase and α-glucosidase inhibitory assays, along with phytochemical evaluation, total phenolic content estimation, and HPTLC fingerprinting.

2. REVIEW OF PLANT PROFILE

2.1 Botanical Profile

Synonyms: *Cymburus urticifolia* (Salisb.) and *Zappania urticifolia* (Salisb.)

- **Kingdom:** Plantae
- **Phylum:** Tracheophyta
- **Class:** Magnoliopsida
- **Order:** Lamiales
- **Family:** Verbenaceae
- **Genus:** *Stachytarpheta*
- **Species:** *Stachytarpheta urticifolia* Sims

2.2 Morphology

Stachytarpheta urticifolia is commonly known as blue snakeweed and nettle leaf velvet berry. It is a perennial herb that grows wild in the Sylhet and Chittagong districts of Bangladesh and is also cultivated as an ornamental weed. The species is distributed in Africa, the islands of the Indian Ocean (Seychelles, Comoros, Madagascar, Reunion, and Mauritius), South-East Asia, eastern Australia, New Caledonia, and the Pacific islands.

The plant attains a height of 0.5–1.5 m and bears ovate to elliptic-ovate or oblong serrate leaves with four-angled softly pubescent stems. The calyx lobes are shortly 5-toothed, and the corolla is dark purple-blue, mauve, or royal blue with a light or white throat. The leaves are opposite and simple. The petiole, measuring 0.5–2 cm, is winged by the extension of the lamina. The lamina is oval or elliptical, 3–8 cm long and 2–4.5 cm wide, with an attenuated base on the petiole, an acute apex, and margins cut into pointed triangular teeth. The upper surface is corrugated, while the underside is smooth except for slight pubescence along the ribs and the base of young leaves.

2.3 Distribution and Habitat

The plant is widely distributed in tropical and subtropical regions and thrives in open habitats, roadsides, wastelands, and cultivated ornamental settings.

2.4 Traditional Uses

Stachytarpheta urticifolia has been traditionally used in folk medicine for the treatment of fever, rheumatic inflammation, venereal diseases, dropsy, ulcers, and various stomach disorders. An infusion of the bark has been recommended for the treatment of diarrhea and dysentery. It is also reported to be used as an abortifacient agent by tribal communities in Bangladesh.

2.5 Phytochemistry

Phytochemical investigations of *Stachytarpheta urticifolia* have revealed the presence of saponins, flavonoids, terpenoids, steroids, glycosides, quinones, alkaloids, tannins, and phenols in different extracts of

the root, stem, leaf, and inflorescence. The methanolic leaf extract contains the iridoid glycoside ipolamiide, whereas the n-hexane root extract yielded the sterol α-spinasterol.

2.6 Pharmacological Activities

2.6.1 Antibacterial Activity

The aqueous extract of *S. indica* root and the methanolic extract of *S. urticifolia* leaf have shown significant antibacterial activity against various bacterial species, comparable to standard antibiotics such as streptomycin and ampicillin. Several studies have also demonstrated the antimicrobial potential of *S. jamaicensis* extracts against pathogenic bacteria and fungi.

3. RATIONALE OF THE STUDY

Diabetes mellitus is one of the leading causes of disability and mortality worldwide and imposes significant financial and psychological burdens on affected individuals. Although numerous drugs are available for the management of diabetes, their use is often limited by adverse effects and long-term complications. Therefore, herbal medicines are increasingly being explored as safer and effective alternatives for the management of diabetes mellitus.

One of the most promising approaches in the search for anti-diabetic agents from natural sources is the selection of plants based on ethnomedical leads and the scientific evaluation of their efficacy and safety using modern experimental methods. *Stachytarpheta urticifolia* is recognized in traditional medicinal systems and is reported to possess various pharmacological activities. However, there is limited definitive scientific evidence regarding its in vitro anti-diabetic potential.

Hence, the present investigation was undertaken to scientifically evaluate the anti-diabetic activity of *Stachytarpheta urticifolia* leaves using in vitro enzyme inhibition models.

4. AIM AND OBJECTIVES OF THE WORK

4.1 Aim

To evaluate the in vitro anti-diabetic activity of the ethanol extract of *Stachytarpheta urticifolia* leaves.

4.2 Objectives

- Collection and authentication of *Stachytarpheta urticifolia* leaves
- Solvent extraction of air-dried *Stachytarpheta urticifolia* leaves
- Preparation of ethanol extract
- Preliminary phytochemical screening of *Stachytarpheta urticifolia* leaf extracts
- Determination of total phenolic content
- Standardization of extract using HPTLC fingerprinting
- Determination of in vitro anti-diabetic activity by:
    - Inhibition of α-amylase enzyme
    - Inhibition of α-glucosidase enzyme

5. MATERIALS AND METHODS

5.1 Collection of Specimens

Fresh leaves of *Stachytarpheta urticifolia* were collected from the local area of Nellore during December 2026 and authenticated using standard floras (Gamble, 1935; Henry et al., 1987).

Note: Verify the collection year (**2026**) before submission.

5.2 Materials for Phytochemical Screening

The chemicals and reagents used included petroleum ether, chloroform, methanol, distilled water, hydrochloric acid, sulphuric acid, acetic anhydride, sodium nitroprusside, pyridine, potassium hydroxide, phenolphthalein, ferric chloride, gelatin, sodium chloride, lead acetate, bromine, magnesium, benzene, silica gel, Mayer's reagent, Dragendorff's reagent, Wagner's reagent, Hager's reagent, alcoholic α-naphthol, Fehling's reagent, Benedict's reagent, Millon's reagent, Biuret reagent, and ninhydrin solution.

5.3 Extraction

About 1 kg of powdered leaf material was successively extracted using petroleum ether, chloroform, benzene, and ethanol in a Soxhlet apparatus. The extracts were concentrated, and residual solvents were removed under reduced pressure. The dried extracts were stored in vacuum desiccators for further use.

The aqueous extract was prepared by macerating the leaf powder in double-distilled water. The extract was concentrated on a water bath and stored in a desiccator.

5.4 Preliminary Phytochemical Screening

The concentrated extracts were subjected to standard qualitative phytochemical tests for the detection of alkaloids, carbohydrates and glycosides, phytosterols, fixed oils and fats, saponins, phenolic compounds and tannins, proteins and free amino acids, gums and

mucilage, and flavonoids using established procedures.

5.5 Determination of Total Phenolic Content

Based on the preliminary phytochemical screening, the plant extract was analyzed for total phenolic content using the Folin–Ciocalteu reagent method, with quercetin as the standard.

5.5.1 Standard Curve of Quercetin

One milligram of quercetin was dissolved in 100 mL of distilled water. Serial dilutions were prepared to obtain concentrations of 2, 4, 6, 8, and 10 µg/mL. Each aliquot was mixed with 1.25 mL Folin–Ciocalteu reagent and allowed to stand for 5 min. Then, 2.5 mL of 20% sodium carbonate was added, and the mixture was allowed to react for 30 min. The final volume was adjusted to 10 mL, and absorbance was measured at 765 nm. A calibration curve was plotted using absorbance versus concentration.

5.5.2 Sample Preparation

About 0.5 g of extract was dissolved in 100 mL of water. From this, 0.1 mL was transferred to a 10 mL standard flask, followed by addition of 1.25 mL Folin–Ciocalteu reagent. After 5 min, 2.5 mL of 20% sodium carbonate was added, and the volume was made up to 10 mL. The solution was allowed to stand for 30 min, and absorbance was measured at 765 nm. Total phenolic content was calculated from the quercetin calibration curve and expressed as quercetin equivalents.

5.6 HPTLC Fingerprinting of Extract

High-Performance Thin-Layer Chromatography (HPTLC) was employed for the standardization and fingerprinting of the ethanol extract.

5.6.1 Sample Preparation

About 1 g of plant powder was extracted with ethanol. The extract was evaporated to dryness, and 1 mg of dried extract and standard quercetin were separately dissolved in 1 mL ethanol using sonication. The solutions were filtered before application.

Table 5.1. Optimized HPTLC Chromatographic Conditions

Parameter	Condition
Application Mode	CAMAG Linomat IV Applicator
Application Syringe	Hamilton–Bonaduz 695.0014 CA
Filtering System	Advance Micro-devices Pvt. Ltd. PTFE 0.2 µm
Stationary Phase	MERCK TLC/HPTLC Silica gel 60 F254 on aluminum sheets (10 × 4 cm)
Applying Distance	10 mm
Band Width	8 mm
Band Spacing	6 mm
Volume of Sample	10 µL
Separation Mode	CAMAG Twin Trough Chamber
Development Distance	80 mm from plate base
Plate Drying	5 min with cold air
Spraying Mode	Dip tank of 500 mL capacity
Spraying Time	0.5–1.0 min
Drying Mode/Temperature/Time	CAMAG TLC Plate Heater preheated at 100 ± 5°C for 5 min

Table 5.2. Solvent System for HPTLC Fingerprinting

S. No.	Sample	Solvent System	Visualization Mode / Spray Reagent
1	Ethanol extract of *Stachytarpheta urticifolia* (EESU)	Ethyl acetate : formic acid : water (6:1:1)	Anisaldehyde + H_2SO_4
2	Standard flavonoid (quercetin)	Ethyl acetate : formic acid : water (6:1:1)	Anisaldehyde + H_2SO_4

5.7 In Vitro α-Amylase Inhibitory Activity of EESU

5.7.1 Starch Solution

A 1% w/v potato starch solution was prepared in 20 mM sodium phosphate buffer containing 6.7 mM sodium chloride in deionized water. The pH was adjusted to 6.9 at 20°C with 1 M sodium hydroxide. The starch solution was heated with constant stirring for 15 min and then cooled to room temperature.

5.7.2 Enzyme Solution

A 1 U/mL α-amylase solution was prepared in cold deionized water immediately before use.

5.7.3 Colorimetric Reagent

- **Reagent A:** 12 g sodium potassium tartrate tetrahydrate in 8 mL of 2 M sodium hydroxide
- **Reagent B:** 96 mM 3,5-dinitrosalicylic acid in 20 mL deionized water

The colorimetric reagent was prepared by slowly adding Reagent A to Reagent B with stirring and making the final volume up to 40 mL.

5.7.4 Procedure

One milliliter of starch solution was mixed with 1 mL of increasing concentrations of inhibitor (EESU: 100–1000 µg/mL; acarbose: 5–50 µg/mL). Then 1 mL of enzyme solution was added and allowed to react for 3 min at 25°C. After incubation, 1 mL of colorimetric reagent was added, and the mixture was heated in a boiling water bath for 10–15 min. The absorbance was measured at 540 nm against reagent blank.

The percentage inhibition was calculated as:

% Inhibition = [(Positive control − Test) / Positive control] × 100

5.8 In Vitro α-Glucosidase Inhibitory Activity of EESU

The α-glucosidase inhibitory activity of EESU was evaluated using a slightly modified method of Dahlqvist (1970). Instead of yeast α-glucosidase, mouse small intestine homogenate was used to better reflect the in vivo state.

5.8.1 Preparation of Enzyme Source

Mice were fasted for 20 h prior to sacrifice. The small intestine was carefully dissected out (between the pylorus sphincter and cecum), rinsed with ice-cold saline, and homogenized with 12 mL maleate buffer (100 mM, pH 6.0). The homogenate served as the enzyme solution.

Important ethical note: Add **Institutional Animal Ethics Committee (IAEC) approval number** before submission.

5.8.2 Procedure

The assay mixture consisted of:

- 100 mM maleate buffer (pH 6.0)
- 2% w/v maltose substrate solution (100 µL)
- EESU (100–1000 µg/mL)
- Acarbose (10–50 µg/mL)

The mixture was pre-incubated for 5 min at 37°C. The liberated glucose was measured using the glucose oxidase method, and absorbance was recorded at 540 nm.

The inhibition percentage was calculated using:

% Inhibition = [(Positive control − Test) / Positive control] × 100

6. RESULTS

6.1 Preliminary Phytochemical Analysis

Table 6.1. Preliminary Phytochemical Analysis of Various Extracts

Sl. No.	Test	Petroleum Ether	Benzene	Chloroform	Ethanol	Water
1	Carbohydrates	-	-	-	+	+
2	Alkaloids	-	-	-	+	+
3	Glycosides	-	-	-	+	+
4	Tannins	-	-	-	+	+
5	Steroids	+	+	+	-	-
6	Triterpenoids	+	+	+	+	-
7	Volatile oils	-	-	-	-	-
8	Fats and fixed oils	-	-	-	-	-
9	Flavonoids	-	-	-	+	+
10	Polyphenols	-	-	-	+	+
11	Saponins	-	-	-	+	+

Sl. No.	Test	Petroleum Ether	Benzene	Chloroform	Ethanol	Water
12	Amino acids	-	-	-	+	+
13	Gums and mucilage	-	-	-	-	+

The phytochemical analysis revealed that the ethanol and aqueous extracts contained major phytoconstituents such as flavonoids, polyphenols, alkaloids, triterpenoids, tannins, carbohydrates, saponins, and amino acids.

6.2 Yield and Total Phenolic Content

Table 6.2. Yield and Total Phenolic Content of Various Extracts of *Stachytarpheta urticifolia*

Extract	Percentage Yield (% w/w)	Total Phenolic Content
Petroleum ether	5.39	30.21 ± 2.37
Benzene	2.55	21.29 ± 2.17
Chloroform	10.24	19.04 ± 3.41
Ethanol	26.63	254.66 ± 19.55
Water	20.17	182.92 ± 12.16

Among all extracts, the ethanol extract showed the highest percentage yield (26.63% w/w) and the highest total phenolic content (254.66 ± 19.55), indicating its superior ability to extract phenolic bioactive constituents.

6.3 HPTLC Analysis

Table 6.3. Rf Values of Ethanol Extract of *Stachytarpheta urticifolia* in HPTLC Analysis

Peak	Start Rf	Max. Rf	End Rf	Max Height	Area	Area %
1	0.109	0.177	0.197	98.6	3868.2	6.01
2	0.303	0.318	0.318	118.5	4186.3	6.42
3	0.318	0.352	0.398	159.7	5135.5	7.62
4	0.398	0.429	0.442	242.9	10625.6	10.73
5	0.442	0.488	0.487	323.6	10247.9	12.23
6	0.487	0.494	0.504	258.8	7462.7	10.65
7	0.504	0.518	0.548	288.8	13253.5	18.11
8	0.548	0.566	0.578	173.9	5317.6	5.88
9	0.578	0.591	0.629	193.4	9637.2	11.44
10	0.629	0.642	0.656	121.3	4269.4	6.51
11	0.656	0.699	0.714	99.9	3417.3	4.42

The HPTLC analysis of the ethanol extract revealed multiple peaks. Peak 4 (Max Rf = 0.429) closely corresponded to the standard quercetin peak (Rf ≈ 0.430), confirming the presence of quercetin in the extract. The estimated quantity of quercetin in the ethanol extract was approximately 0.214 mg/g.

6.4 In Vitro α-Amylase Inhibitory Activity

Table 6.4. In Vitro α-Amylase Inhibitory Activity of EESU

Test Sample	Concentration (µg/mL)	% α-Amylase Inhibition	IC_{50} (µg/mL)
EESU	100	7.110 ± 1.765	269.88
	200	27.655 ± 3.167	
	400	42.657 ± 1.325	
	800	61.189 ± 2.716	
	1000	76.432 ± 1.523	
Standard (Acarbose)	5	13.239 ± 1.448	27.49

Test Sample	Concentration (µg/mL)	% α-Amylase Inhibition	IC_{50} (µg/mL)
	10	27.451 ± 1.440	
	20	49.715 ± 0.684	
	40	74.327 ± 1.708	
	50	87.814 ± 1.853	

All values are expressed as mean ± SEM of three parallel measurements.

EESU showed increasing α-amylase inhibition with increasing concentration, with an IC_{50} value of 269.88 µg/mL. The standard drug acarbose exhibited stronger inhibition at much lower concentrations with an IC_{50} value of 27.49 µg/mL.

6.5 In Vitro α-Glucosidase Inhibitory Activity

Table 6.5. In Vitro α-Glucosidase Inhibitory Activity of EESU

Test Sample	Concentration (µg/mL)	% α-Glucosidase Inhibition	IC_{50} (µg/mL)
EESU	100	19.995 ± 2.432	351.38
	200	45.267 ± 1.262	
	400	57.264 ± 2.154	
	800	67.213 ± 1.987	
	1000	87.352 ± 1.654	
Standard (Acarbose)	5	11.121 ± 2.152	25.07
	10	30.543 ± 1.793	
	20	50.273 ± 2.191	
	40	70.197 ± 2.117	
	50	86.195 ± 1.727	

All values are expressed as mean ± SEM of three parallel measurements.

EESU demonstrated progressive α-glucosidase inhibition with increasing concentration, with an IC_{50} value of 351.38 µg/mL. Acarbose showed greater potency with an IC_{50} value of 25.07 µg/mL.

7. DISCUSSION

Stachytarpheta urticifolia, a medicinally important plant, was investigated in the present study for its in vitro anti-diabetic potential using the ethanol extract of its leaves (EESU). The phytochemical screening revealed the presence of several bioactive constituents such as alkaloids, flavonoids, tannins, polyphenols, saponins, and triterpenoids, which are frequently associated with pharmacological activity.

Among the various solvent extracts, the ethanol extract exhibited the highest percentage yield and maximum total phenolic content, suggesting that ethanol is an efficient solvent for extracting phenolic- and flavonoid-rich compounds from the plant material. HPTLC fingerprinting confirmed the presence of quercetin, a well-known flavonoid with documented antioxidant and anti-diabetic properties.

The in vitro enzyme inhibition studies demonstrated that EESU possesses concentration-dependent α-amylase and α-glucosidase inhibitory activities. These enzymes play a crucial role in the digestion and absorption of carbohydrates, and their inhibition can delay glucose release and reduce postprandial hyperglycemia. Although the inhibitory effect of EESU was lower than that of the standard drug acarbose, the extract showed substantial activity at higher concentrations.

The anti-diabetic activity observed in EESU may be attributed to its high phenolic and flavonoid content, particularly quercetin, which may contribute to enzyme inhibition and modulation of carbohydrate metabolism. Thus, the findings support the traditional medicinal relevance of *Stachytarpheta urticifolia* and indicate its potential as a natural source of anti-diabetic phytoconstituents.

8. CONCLUSION

The present investigation demonstrated that the ethanol extract of *Stachytarpheta urticifolia* leaves

(EESU) possesses significant in vitro anti-diabetic activity. Phytochemical screening confirmed the presence of several bioactive constituents, and the high total phenolic content of the ethanol extract indicated its phytochemical richness.

HPTLC fingerprinting confirmed the presence of quercetin, an important flavonoid that may contribute to the biological activity of the extract. The extract exhibited notable α-amylase and α-glucosidase inhibitory activities in a concentration-dependent manner, suggesting its ability to reduce carbohydrate digestion and glucose absorption.

Although the activity of EESU was comparatively lower than that of the standard drug acarbose, the findings clearly indicate that *Stachytarpheta urticifolia* has promising potential as a natural anti-diabetic agent. Further studies involving isolation of active constituents, in vivo evaluation, toxicity assessment, and mechanistic investigations are recommended to establish its therapeutic significance.

9. SUMMARY

The present study was undertaken to evaluate the in vitro anti-diabetic activity of the ethanol extract of *Stachytarpheta urticifolia* leaves (EESU). The study involved phytochemical screening, estimation of total phenolic content, HPTLC fingerprinting, and in vitro enzyme inhibitory assays against α-amylase and α-glucosidase.

Fresh leaves of *Stachytarpheta urticifolia* were collected, authenticated, dried, powdered, and extracted using various solvents. Among the extracts, the ethanol extract showed the highest percentage yield and was selected for further evaluation. Preliminary phytochemical screening revealed the presence of important bioactive constituents such as alkaloids, flavonoids, tannins, glycosides, saponins, and polyphenols.

The total phenolic content was found to be highest in the ethanol extract, indicating its richness in phenolic compounds. HPTLC analysis confirmed the presence of quercetin, a flavonoid known for its antioxidant and anti-diabetic properties.

In vitro anti-diabetic studies showed that EESU exhibited concentration-dependent inhibition of both α-amylase and α-glucosidase enzymes. The extract demonstrated significant inhibitory activity, although the standard drug acarbose showed higher potency at lower concentrations.

Overall, the study suggests that the ethanol extract of *Stachytarpheta urticifolia* leaves possesses promising anti-diabetic potential, which may be attributed to its rich phytochemical composition, particularly phenolic compounds and flavonoids.

REFERENCES

1. Gowri Evalution of antioxidant activity of ethanolic extract of sphaeranthus amaranathoides Burm.f in M.S.Ramaiah college of pharmacy 2013.
2. Akuodor GC, Essien AD, Udia PM, David-Oku E, Chilaka KC, Asika EC, et al. Analgesic, anti-inflammatory and antipyretic potential of the stem bark extract of Stachytarpheta indica. Br J Pharmacol Toxicol 2015;6:16-21.
3. Chowdhury R, Rashid MU, Khan OF, Choudhury MH. Bioactivity of extractives from Stachytarpheta urticaefolia. Pharm Biol 2004;42:262-7.
4. Udodeme HO, Odoh UE, Ugwu PN, Diovu EO, Okonta EO, Onyekere PF, et al. Pharmacognostic studies of the leaves of Stachytarpheta jamaicensis Linn. (Vahl) (Verbenaceae). Int J Pharmacogn Phytochem Res 2016;8:1503-8.
5. Sreelatha R, Kasturi A, Kumar S, Challa M. In vitro antimicrobial activity of different parts of stachytarpheta urticifolia (Salisb) Sims. Int J Pham Pharm Sci 2013;6:340-3
6. Sreelatha R, Challa M, Kasturi A, Edavana SK, Sanivada SK. Phytochemical screening, total phenol content and antioxidant activity of different parts of Stachyterpheta urticifolia (Salisb) Sims. JPR 2013;1:718-23.
7. Conforti, F., Statti, G., Loizzo, M.R., Sacchetti, G., Poli, F., Menichini, F., 2005. In Vitro antioxidant effect and inhibition of alpha-amylase of two varieties of Amaranthus caudatus seeds. Biological and Pharmaceutical Bulletin

28, 1098–1102.

8. Dahlqvist A. Assay of intestinal disaccharidases. Enzymol. Biol. Clin. 11:52-66, 1970.

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