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Nutraceutical potential of wild edible plant -*OXALIS Corniculata L.*

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Abstract
Tribal and indigenous populations frequently employ *Oxalis corniculata* L., a wild edible herb that is neglected and underused. One such plant with notable antioxidant capacity and medicinal use is *Oxalis corniculata* L. It is well known that antioxidants may neutralize dangerous free radicals. *Oxalis corniculata* L. is an edible wild plant that is a member of the Oxalidaceae family. By assessing the phytochemical, antioxidant, and antidiabetic properties of the plant's ethanol and aqueous extracts, the nutritional and medicinal potential of the plant was investigated. To determine the phytoconstituents present, all of the extracts underwent qualitative phytochemical screening. The anti-diabetic impact of the conventional medication Metformin was investigated using α-amylase and α-glucosidase inhibitory activities. At dosages of 60, 80, and 100 µg/mL, ethanol extracts strongly inhibited both enzymes, indicating potential anti-diabetic action.

Keywords: *Oxalis corniculata L.*, phytochemical screening, antioxidant, DPPH radical scavenging activity, anti-diabetic activity

Introduction

In recent decades, rapid lifestyle changes have significantly altered human dietary habits, contributing to a rise in many disorders. Type 2 diabetes mellitus (T2DM) is widely regarded as a lifestyle disorder, as factors like unhealthy diet; physical inactivity, stress, and obesity significantly contribute to its development and progression.

In response, researchers are actively investigating natural ingredients to create balanced, functional foods, plant-based supplements. At the same time, pharmaceutical scientists are developing plant-derived medicines and formulations aimed at improving therapeutic efficacy and minimizing side effects. Identifying new treatments typically begins with the comprehensive screening of individual plants, many of which have been examined for their antioxidant properties to combat diabetes (Nain, Saini, Sharma, & Nain, 2012) [1].

Antioxidants perform a substantial role in the prevention and controlling of diabetes, especially T2DM. Diabetes is associated with increased oxidative stress, where harmful free radicals in the body exceed the capacity of natural antioxidants. This oxidative stress contributes to insulin resistance, damage to pancreatic β-cells and ultimately cause progression of diabetic complications (Tuell, Los, Ford, & Stone, 2023) [2].

Diabetes management remains a global issue, with no effective medication currently available. Pharmaceutical scientists are developing plant-based medicines and formulations to enhance efficacy and reduce side effects available antidiabetic synthetic drug (Malviya, Jain, & Malviya, 2010) [3]. To develop new medications or therapeutics, individual plants are first screened from several angles. Various plants have been studied for their anti-oxidant qualities, α –amylase and α –glucosidase inhibition properties to fight diabetes.

Oxalis corniculata L., a weedy perennial herb belongs to family Oxalidaceae, cosmopolitan common weed found in open area, along roadsides, crop-free waste places and under shade. Usually called as common Sorrel, Indian Sorrel. In various localities of India, it is known by different name for example Amrul sak, Chukutri pathiya, Tinpathiya (Hindi); Pullampurchi soppu, Hulisoppu (Kannada); Puliarai (Tamil); Pulichinta (Telugu); Ambiliti, Kumari (Oria); Changeri (Sanskrit); Ambusi, Ambuti, Tipani (Marathi); Kottampulichan, Poliyarala, Puliyarila, Pulivayila, Pulichappadi, Pulisanthala, Pulichan (Malayalam) -(Rao & Kumar, 2026) [4].

O. corniculata L. were reported as it is used aa food by tribal communities of central India (Jain, Tiwari, & Bashir, 2010) [5]. It was reported that *O. corniculata L.* were use by the Kota tribe women as breast milk enhancer (Dutta, Bisai, & Subramaniam, 2019) [6]. Ethnomedicinal reviews showed that *O. corniculata L.* is used for chest discomfort, headaches, stimulants, anemia, diarrhea, and dysentery (Ibrahim *et al*., 2013) [7]. It was found that the aqueous extract exhibits antioxidant, anti-hyperglycemic and anti-hyperlipidemic properties (Himaja & Das, 2015) [8].

The present research provides a comprehensive analysis of the nutraceutical, phytochemical composition, evaluation of antioxidant and anti-diabetic properties of *O. corniculata L.*

Materials and Methods

1. Botanical Procurement and Extract Preparation

- **Sample Procurement:** Wild populations of *O. corniculata L.* were harvested from the Akola region, situated within the Amravati division of Maharashtra state.
- **Pulverization:** The gathered foliar tissues were meticulously rinsed using distilled water to eliminate debris, desiccated under shade, and subsequently ground up into a fine powder utilizing a laboratory blender. The resultant powder was preserved in hermetically sealed containers at ambient temperature prior to analysis.

- **Extraction Process:** Menstruum of both aqueous and ethanolic nature were prepared by subjecting the plant matrix to continuous hot extraction using a Soxhlet apparatus.

Table 1: Summary of methods used for phytochemical analysis

Parameter	Method	Procedure Summary	Wavelength/ Conditions	Standard/ Calculation	Reference
Phytochemical Screening	Qualitative/ Quantitative Tests	Whole plant extract of *O. corniculata L.* tested for Carbohydrates, Proteins, Amino acids, Alkaloids, Flavonoids, Tannins, Saponins, Steroids using aqueous/alcoholic solvents	-	-	Raghavendra *et al*. (2006) [9]; Ahmed *et al*. (2012) [10]; (Mohan & Pandey, 2016) [11]; (Harborne, 1998); Kokate *et al*. (2005) [12, 13]; (Evans, 2009) [14]; (Vadivel & Sudha, 2025) [15]
Total Ash Content	Ash Content Method	2g sample charred, incinerated at 600°C for 2h in muffle furnace, weighed after cooling	-	% of original weight	(Horwitz & Latimer, 2005) [16]
Total Carbohydrates	Phenol-Sulfuric Acid Method	Hydrolyzed in hot acid, neutralized, treated with 5% phenol, heated to form yellow-green complex	490 nm	Glucose standard curve, % carbohydrates	(Nielsen, 2009); (Nielsen, 2024) [17, 18]
Total Protein	Biuret Method	Samples in 0.85% NaCl + Biuret reagent, incubated 30 min at 25°C, violet complex formed	550 nm	Protein standard curve	(Tiwari, 2015) [19]
Total Lipids	Soxhlet Extraction	15g dried powder extracted 8-10h with methanol/chloroform/petroleum ether, solvent evaporated at 100°C	-	% of dried sample	(Min & Ellefson, 2010) [20]
Total Phenolics	Folin-Ciocalteu Method	Extract + Folin reagent + Na_2CO_3, reacted 40 min at RT, blue complex formed	725 nm	Gallic acid (10-100 µg/mL), T = (C × V)/M	(Lamuela-Raventos, 2018) [21]
Total Flavonoids	Aluminium Chloride Method	Extract + $AlCl_3$ + potassium acetate + ethanol + water, incubated 30 min at RT, yellow complex	415 nm	Quercetin (10-100 µg/mL) standard curve	(Shraim *et al*., 2021) [22]
Antioxidant Activity	DPPH Free Radical Scavenging	Sample (100 µg/mL) + DPPH (1.083 mg/10 mL ethanol), serial dilutions	517 nm	% Scavenging = 1 - (Abs test/Abs control), Ascorbic acid standard	(Blois, 1958) [23]
α-Amylase Inhibition	Iodine-Starch Test	Extract (200-1000 µg/mL) + 1% starch + α-amylase, incubated 37°C 1h, + iodine reagent	565 nm	% Inhibition vs Acarbose standard	(Mogole, Omwoyo, & Mtunzi, 2020) [24]
Inhibition of α-glucosidase	Enzyme Inhibition Assay	2% maltose + Tris buffer + extract (100-500 µg/mL), + α-glucosidase (1 U/mL), 35°C 40 min, stopped with 6N HCl	540 nm	% Inhibition vs Acarbose standard	(Narkhede, 2011) [25]

2. Compositional and Phytochemical Profiling

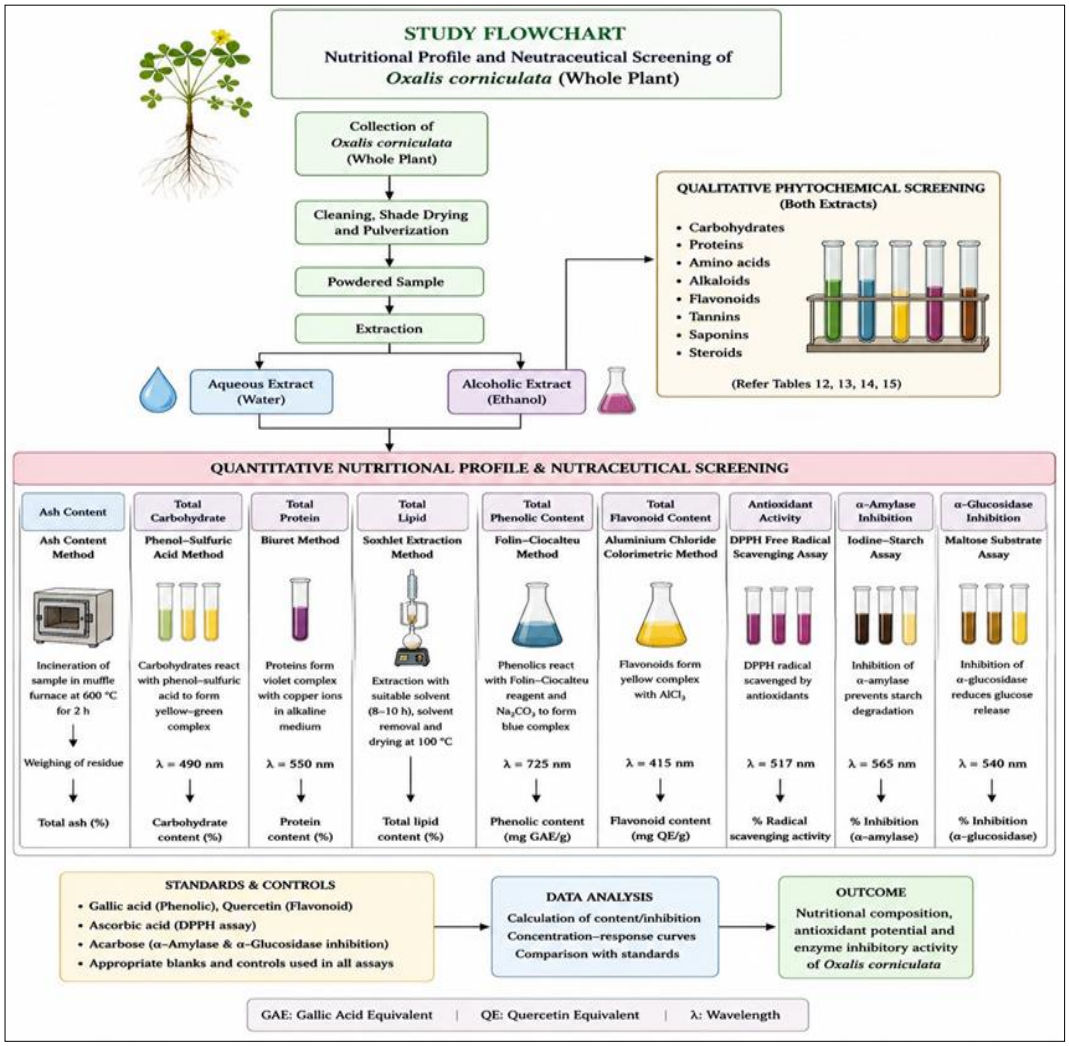
The extracted matrices were subjected to systematic qualitative screening and quantitative estimation to map their nutritional and secondary metabolite profiles:

- **Phyto-profiling:** Preliminary qualitative protocols were deployed to verify the detection of metabolic groups, including primary metabolites such as carbohydrates, proteins, amino acids and secondary metabolites such as alkaloids, flavonoids, tannins, saponins, and steroids.
- **Ash Evaluation:** A 2 gm dried aliquot was subjected to thermal degradation inside a muffle furnace maintained at 600ºC for a duration of 2 hours for total ash quantification.
- **Carbohydrate Quantification:** Total soluble sugar content was monitored via the Phenol-Sulfuric Acid approach, recording the optical density at 490 nm.
- **Protein Estimation:** Total protein content was monitored colorimetrically via the Biuret assay at a wavelength of 550 nm.
- **Lipid Determination:** Total crude lipids were gravimetrically determined post organic solvent extraction via the Soxhlet method and subsequent drying at 100ºC.
- **Phenolic and Flavonoid Yield:** Total phenolic constituents were measured using the Folin-Ciocalteu reagent 725 nm, while total flavonoid fractions were analyzed via the Aluminium Chloride complexation method 415 nm).

3. In-Vitro Antioxidant and Antidiabetic Evaluations

- **(DPPH) radical scavenging assay:** The hydrogen donating capacity of the extracts was tracked using the DPPH radical assay. Ascorbic acid served as the reference standard, and the diminishing absorbance was captured at 517 nm.
- **α-Amylase Suppressive Assay:** The starch-hydrolyzing inhibitory capacity was measured through an Iodine-Starch framework. Metformin/Acarbose was utilized as the benchmark inhibitor, with the final colorimetric response evaluated at 565 nm.
- **α-Glucosidase Suppressive Assay:** The enzymatic restriction was evaluated using a substrate mix containing 2% maltose prepared in Tris buffer, with the final spectrophotometric reading captured at 540 nm.

Technical Workflow



Result

Phytochemical Screening

Screening the presence of seven type of phytoconstituents such as carbohydrates, protein, alkaloids, flavonoids, tannins, amino acids and steroids was carried out in the alcoholic and aqueous extract of the whole plant of *O. corniculata L.* All the phytochemical content was carefully observed, identified and noted.

The result of phytochemical screening, all the screened phyotoconstituents present in both inference (aqueous and alcoholic extract) of the leaf part of *O. corniculata L.* except amino acids. In case of steroids content, steriods showing the presence in the inference of the alcoholic extract and showing absence in the aqueous extract of the leaf part of *O. corniculata L.* (Table – 2).

Table 2: Phytochemical Screening of the whole plant extract of *Oxalis corniculata L.*

Sr. no	Phytoconstituent	Inference	
		Aqueous	Alcoholic
1.	Carbohydrates	+	+
2.	Proteins	+	+
3.	Alkaloids	+	+
4.	Flavonoids	+	+
5.	Tannins	+	+
6.	Amino acids	-	-
7.	Steroids	-	+

The analysis of *Oxalis corniculata L.* showed characteristic nutritional features. The water content of the plant was recorded at 55.56%, indicating a moderate level of moisture in its fresh tissues. The protein content was measured at 30.30%, reflecting the presence of essential nitrogenous compounds within the plant material. The carbohydrate content was found to be 31.81%, contributing to its role as an energy-providing component. The crude fibre value of 0.75% indicates a relatively low level of structural fibre in the plant. Although the combined ash content for both plant samples showed a mean of 10.12 ± 2.42%, a specific ash percentage for *Oxalis corniculata L.* was not individually reported. Overall, the findings highlight the moisture, protein, carbohydrate, and fibre composition characteristic of *Oxalis corniculata L.* (Table –3).

Table 3: *Oxalis corniculata L.* wild edible plants.

Plant	Moisture (%)	Protein (%)	Carbohydrate (%)	Lipid (%)	Ash (%)	Fiber (%)
Oxalis corniculata L.	55.96	37.32	63.7	19.08	12.55	0.75

Total Carbohydrate Content

The phenol–sulfuric acid method, which is based on the dehydration of glucose in hot, low pH conditions to make hydroxymethyl furfural, which interacts with phenol to

produce a green complex detectable at 490 nm, was used to quantify the total carbohydrate content of *Oxalis corniculata L.* A glucose standard curve prepared in the range of 0.2–1.0 mL showed a linear increase in absorbance. The plant extract showed absorbance values of 2.411 and 2.811 for 0.1 mL and 0.2 mL test volumes, respectively. Using the standard curve equation, these absorbance values corresponded to 3.18 mg and 8.37 mg of glucose equivalents. After back calculation, the total carbohydrate content was found to be 31.8% and 63.7% (mg/g) of the sample, indicating that *Oxalis corniculata L.* is a carbohydrate-rich wild edible plant with notable nutritional value.

Total Protein Content

The total protein content in *Oxalis corniculata L.* was determined using the Biuret method. This method relies on the reaction between peptide bonds and copper ions in an alkaline medium, resulting in the formation of a violet-colored complex. The intensity of the color produced was measured at 550 nm and used to estimate the protein content. The absorbance of the test sample was recorded as 0.418, and protein standards were used to generate a calibration curve with the equation Y = 0.003x + 0.362, showing a linear relationship between absorbance and protein concentration. From the standard curve, the protein concentration corresponding to the sample absorbance was calculated as 18.66 mg. Based on back calculations, the protein content of the sample was determined to be (18.66 ÷ 5) × 10 = 37.32 mg per gram of sample. These results indicate that *Oxalis corniculata L.* contains a measurable and appreciable amount of protein, contributing to its nutritional value as a wild edible plant.

Total Lipid Content – *Oxalis corniculata L.*

The total lipid content of *Oxalis corniculata L.* was estimated by the Soxhlet extraction method. Fifteen grams of dried plant powder were extracted using a suitable organic solvent. Following extraction, the solvent was removed, and the crude lipid obtained was used to determine the total lipid content. The weight of the lipid extract obtained after evaporation was 2.862 g. Based on this value, the total lipid content of *Oxalis corniculata L.* was calculated to be 19.08%, indicating that the plant contains a moderate amount of lipids and contributes to its nutritional significance as a wild edible species.

Total Phenolic Content

The total phenolic content of *Oxalis corniculata L.* was estimated using the Folin–Ciocalteu method, which measures phenolic compounds based on their ability to reduce the Folin–Ciocalteu reagent, forming a blue complex measurable at 725 nm. A calibration curve of Gallic acid (10–50 µg/mL) was prepared, yielding a linear equation Y = 0.001x + 0.019. The plant extract showed an absorbance of 0.0569, which corresponds to 37.9 mg of Gallic acid equivalents per 0.1 mL of extract. After back calculation to account for the total sample volume, the concentration of total phenolic was determined to be 37.9% mg/g of extract, indicating that *Oxalis corniculata L.* is rich in phenolic compounds, contributing to its antioxidant potential.

Total Flavonoid Content

The total flavonoid content of *Oxalis corniculata* L. was estimated using the Aluminium Chloride Colorimetric Method, in which flavonoids form a complex with aluminum chloride measurable at 415 nm. A standard curve of Quercetin (10–50 µg/mL) gave the equation Y = 0.010x + 0.004. The plant extract showed an absorbance of 0.163, corresponding to 15.9 mg of flavonoids per 0.1 mL of extract. After back calculation to account for the total sample volume, the flavonoid content was determined to be 31.2% mg/g of extract, indicating that *Oxalis corniculata L.* is a rich source of flavonoids, contributing to its antioxidant and potential antidiabetic activities.

Antioxidant activity by DPPH radical scavenging activity.

The antioxidant activity of *Oxalis corniculata L.* was assessed by the DPPH (2,2-diphenyl-1-picrylhydrazyl) free radical scavenging assay, which estimtes the ability of plant extracts to neutralize free radicals. A standard calibration curve using ascorbic acid was prepared, and the absorbance of the plant extract was measured at 517 nm. The absorbance value recorded for *Oxalis corniculata L.* was 0.113, which, after calculation using the linear equation Y = 0.002x + 0.079, corresponded to 17% free radical scavenging activity.

The antioxidant potential of the ethanol extract of *Oxalis corniculata L.* was evaluated using the DPPH (2,2-diphenyl-1-picrylhydrazyl) radical scavenging assay. The results indicate a dose-dependent increase in scavenging activity across all tested concentrations (20–100 µg/mL).

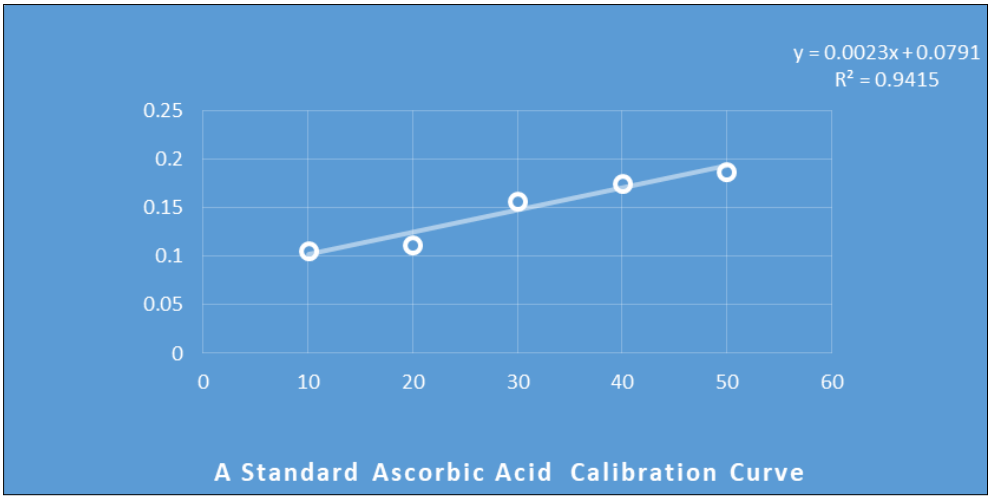


Table 5: DPPH Radical Scavenging Activity of *O. corniculata L.* against Standard

Concentration (µg/mL)	% Inhibition (*O. corniculata L.* Extract)	% Inhibition of Standard (Ascorbic Acid)
20	18.5 ± 0.45	34.5 ± 1.22
40	29.2 ± 0.62	46.8 ± 0.85
60	38.7 ± 0.58	61.2 ± 1.10
80	46.4 ± 0.71	79.4 ± 0.95
100	54.8 ± 0.55	94.2 ± 1.05

The antioxidant capacity of the ethanolic extract of *Oxalis corniculata L.* was evaluated using the DPPH assay, with Ascorbic acid serving as the reference standard. The results exhibited a significant dose-dependent scavenging effect. As shown in the table above, the percentage inhibition increased progressively with the concentration of the extract.

At the peak concentration of 100 µg/mL, *O. corniculata L.* showed a maximum inhibition of 54.8 ± 0.55%, while the standard Ascorbic acid exhibited 94.2 ± 1.05% inhibition. The calculated IC_{50} value for the plant extract was found to be approximately 89.5 µg/mL, indicating a strong antioxidant potential. (Table –5)

Anti-diabetic Activity

The five different concentration of the plants sample (20 µg/mL, 40 µg/mL, 60 µg/mL, 80 µg/mL, 100 µg/mL) use for the analysing the percentage of inhibition of two types of anti-diabetic activity such as *α-Amylase Inhibition* (Figure 1) and *Inhibition of α-glucosidase* (Figure 2) for the whole plant of *Oxalis corniculata L.* were done.

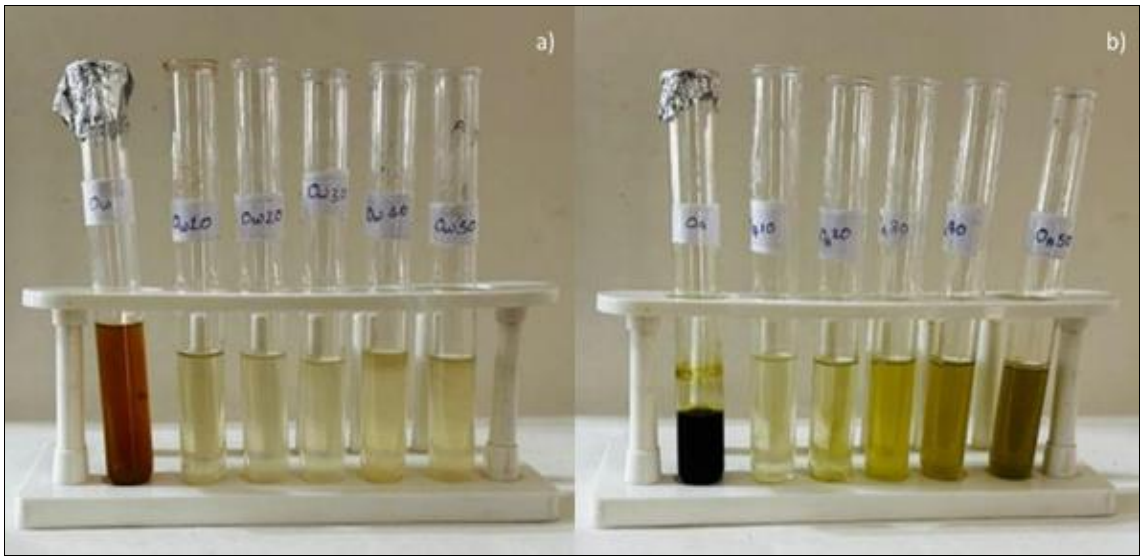


Fig 1: α-Amylase Inhibition Assay of *Oxalis corniculata* L.: (a) Aqueous Extract, (b) Alcoholic Extract

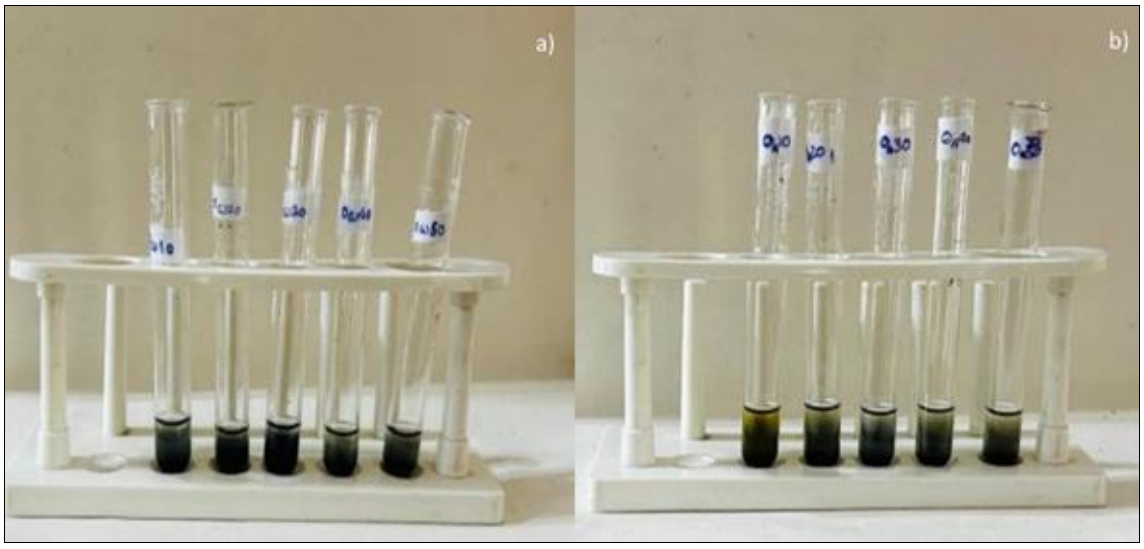


Fig 2: Inhibition of α-glucosidase Assay of *Oxalis corniculata L.*: (a) Aqueous Extract, (b) Alcoholic Extract

Regarding *Oxalis corniculata* L., the percentage of anti-diabetic activity (α-Amylase Inhibition) inhibition was measured in both alcoholic and aqueous extracts. According to concentration (20 microgram/mL, 40 microgram/mL, 60 microgram/mL, 80 microgram/mL, and 100 microgram/mL), the inhibition percentage ranged from 16.8% to 58.9% in the aqueous extract and from 26.3% to 70.5% in the alcoholic extract. The both extract 100 µg/mL showing highest inhibition as compare to other concentration and 20 µg/mL showing lowest percentage of inhibition. The concentration of 100 µg/mL of alcoholic extract showing similar percentage of inhibition with metaformin (concentration of the 10 µg/mL) (Table- 6).

Table 6: Anti-diabetic activity (*α-Amylase Inhibition*) of *Oxalis corniculata L.*

Extract	Concentration (µg/mL)	Absorbance	% Inhibition
Aqueous	20	0.79	16.8%
	40	0.69	27.4%
	60	0.58	38.9%
	80	0.47	50.5%
	100	0.39	**58.9%**
Alcoholic	20	0.70	26.3%
	40	0.56	41.1%
	60	0.44	53.7%
	80	0.33	65.3%
	100	0.28	**70.5%**
Metformin	10	0.28	70.5%
Control	-	0.95	-

In case of the *Oxalis corniculata L.* were observed the percentage of inhibition of the Anti-diabetic activity (*α-Glucosidase Inhibition*) in aqueous and alcoholic extract. The percentage of the inhibition as per concentration (20 microgram/mL, 40 microgram/mL, 60 microgram/mL, 80 microgram/mL, 100 microgram/mL) were found in the range from 16.1% to 60.9% in aqueous extract and 24.1% to 73.6% in alcoholic extract. The both extract 100 µg/mL showing highest inhibition as compare to other concentration and 20 µg/mL showing lowest percentage of inhibition. The concentration of 100 µg/mL of alcoholic extract showing near by similar percentage of inhibition with metaformin (concentration of the 10 µg/mL) (Table-7).

Table 7: Anti-diabetic activity (*Inhibition of α-glucosidase*) of *Oxalis corniculata L.*

Extract	Concentration (µg/mL)	Absorbance	% Inhibition
Aqueous	20	0.73	16.1%
	40	0.63	27.6%
	60	0.53	39.1%
	80	0.41	52.8%
	100	0.34	60.9%
Alcoholic	20	0.66	24.1%
	40	0.51	41.4%
	60	0.38	56.3%
	80	0.29	66.7%
	100	0.23	73.6%
Metformin	10	0.22	74.7%
Control	-	0.87	-

$$\%Inhibition = \frac{AbsorbanceofControl - AbsorbanceofSample}{AbsorbanceofControl}$$

Discussion and conclusion

Several works have been done on various species of the genus *Oxalis* for their antidiabetic and antioxidant properties. This activity largely credited to their rich phytochemical profile. *Oxalis corniculata L.*, *Oxalis debilis*, and *Oxalis latifolia* are well known species commonly studied to contain flavonoids, phenolic acids, tannins, and ascorbic acid. These phytochemicals widely associated with glycemic regulation and oxidative stress reduction studied earlier by Majumdar *et. al* (2026) [27].

Oxalis species capacity to regulate glucose metabolism is closely associated with their antidiabetic effects.

Inhibition of carbohydrate hydrolysing enzymes like α-amylase and α-glucosidase improved insulin sensitivity due to antioxidant effects

Using aqueous and alcoholic extracts at doses of 20, 40, 60, 80, and 100 microgram/mL, the anti-diabetic potential of *Oxalis corniculata* L. was assessed using α-amylase and Inhibition of α-glucosidase tests. For α-amylase inhibition, the aqueous extract exhibited a dose-dependent increase in inhibition from 16.8% at 20 µg/mL to 58.9% at 100 µg/mL, whereas the alcoholic extract showed higher inhibition, ranging from 26.3% to 70.5%. The concentration of 100 µg/mL of the alcoholic extract achieved inhibition comparable to metformin (10 µg/mL), suggesting strong potential for controlling postprandial hyperglycemia. Similarly, in Inhibition of α-glucosidase, aqueous extract inhibition ranged from 16.1% to 60.9%, while alcoholic extract inhibition increased from 24.1% to 73.6% across the tested concentrations. The highest inhibitory activity was consistently observed at 100 µg/mL for both extracts, and the alcoholic extract at this concentration showed inhibition nearly equivalent to metformin (10 µg/mL). Overall, the results indicate that *Oxalis corniculata L.* possesses significant anti-diabetic activity, with the alcoholic extract demonstrating slightly stronger enzyme inhibition than the aqueous extract, and both extracts showing a clear dose-dependent effect.

These mechanisms align with previous findings that plant-derived polyphenols can regulate glucose homeostasis and suppress post-prandial hyperglycemia (Sarkar et. al. 2022) [28].

Antioxidant Activity

Diabetes is mostly caused by oxidative stress, especially when it comes to insulin resistance and β-cell destruction. Because of its high phenolic and flavonoid content, oxalis species have significant antioxidant action. *In vitro* studies using DPPH assays consistently demonstrate strong radical-scavenging effects of *O. corniculata* extracts. The antioxidant potential of *Oxalis* contributes to antidiabetic action in two ways Protection of pancreatic β-cells from oxidative damage Reduction of lipid peroxidation and improvement of overall metabolic balance. Whole plant alcoholic extract of *O. corniculata.* Shown the moderate amount of free radical scavenging activity. This supports earlier research indicating that natural antioxidants from medicinal plants play a central role in preventing diabetes-induced oxidative damage. *O. corniculata* has long been used in ethnomedicinal systems to manage fever, inflammation, digestive disorders, and metabolic conditions. The experimental evidence strengthens its potential as a natural antidiabetic agent.

The findings of many workers supports its claim which suggest that *Oxalis* species possess dual benefits i.e. glucose-lowering activity and potent antioxidant capacity **(**Al-Qalhatiyah, 2015) [29]**.**

The antioxidant potential of *Oxalis corniculata L.* Linn. Fractions in different solvents was investigated through *in vitro* assays and also reported that the plant has adequate quantities of the compounds known for their antioxidant properties (Ahmed, Zara, & Baig, 2012) [10].

The view is supported by reported that he antioxidant and antidiabetic properties of *Oxalis pes-caprae* flowers extract was found to be the possessed the highest phenolic content, which was closely associated with its remarkable

antioxidant, enzyme inhibitory and antiglycation activity, confirming the protective effects on hyperglycemia and oxidative damage (Kabach *et al*., 2023) [26].

The antidiabetic activity was evaluated through α-amylase and αglucosidase inhibitory activity, taking Acarbose as standard and reported that etnalolic extract inhibited both the enzymes substantially ($p<0.05$) at 50, 100 and 200 µg/mL concentrations, that revealed potential anti-diabetic activity of the species (Himaja & Das, 2015) [8].

Antioxidant-rich plant extracts exhibit antidiabetic effects mainly by alleviating oxidative stress, a key factor in the onset and progression of diabetes. Elevated free radicals can damage pancreatic β-cells, disrupt insulin secretion, and contribute to insulin resistance, whereas antioxidants neutralize these reactive species and preserve β-cell function. Moreover, bioactive compounds like phenolics and flavonoids present in plants can inhibit carbohydrate-hydrolyzing enzymes, including α-amylase and α-glucosidase, thereby slowing glucose absorption and lowering postprandial blood glucose levels. By boosting insulin sensitivity and lowering inflammation, antioxidants play an important role in maintaining overall glucose homeostasis.

The above discussion making the plant species promising candidates for developing plant-based antidiabetic medicine. However further research is needed to isolate active compounds, evaluate toxicity, and conduct controlled clinical trials to establish safety and efficacy in humans.

Conclusion

The current phytochemical evaluation highlights that *Oxalis corniculata L.*, have notable antidiabetic and antioxidant properties, largely attributed to their rich phytochemical composition. Experimental evidence from *in vitro* enzyme inhibition assays demonstrates that *Oxalis* extracts effectively reduce postprandial hyperglycemia through inhibition α-amylase and α-glucosidase. Similarly plant exhibit strong antioxidant activity observed in various solvent extracts supports their role in mitigating oxidative stress, a major contributing factor in the pathogenesis and progressive development of diabetes mellitus. The dual mechanism of enzyme inhibition and free radical scavenging suggests a synergistic effect that enhances overall glycemic control and pancreatic β-cell protection. Overall, *Oxalis* species emerge as promising natural candidates for the development of plant-based antidiabetic agents, offering a scientific basis for their traditional medicinal use.

Conflict of Interest

The authors have no conflicts of interest regarding this investigation**.**

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