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The preliminary phytochemical screening, quantification of phenols and flavonoids and antioxidant potential analysis of leaf sample of Ethnomedicinal plant *Actinoscirpus grossus var. kysoor* (Roxb.) Noltie (Family: Cyperaceae)

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Abstract
The use of various plant extracts or bioactive constituents is common in conventional medicine. Traditional herbal medicinal practitioners have identified the therapeutic efficacy of several indigenous plants for various diseases. Synthetic and conventional herbal medicine are indeed derived from natural resources. *Actinoscirpus grossus var. kysoor (*Robx.) Nolite is a herbaceous plant belonging to family Cyperaceae and is used in Ayurveda as medicinal herb for treatment of various diseases. In the present investigation leaf parts of *Actinoscirpus grossus var. kysoor (*Robx.) Nolite was assessed for the qualitative and quantitative screening of phytocomponents and free radical scavenging capacity. Methanol and chloroform extract was prepared by cold maceration method. Preliminary phytochemical screening showed better results in methanolic leaf extract compared to chloroform as it revealed the presence of Alkaloids, Carbohydrates, Phenols, Flavonoids, Terpenoids, and Steroids while Saponins and Glycosides were absent. Total phenol content and total flavonoid content was checked by detailed quantitative analysis, and the results reported as 172.17 ± 0.33 mg GAE/g of sample and 26.66 ± 4.409 mg QE/g of sample respectively. The results suggest the superabundance of phenolic and flavonoid components in plants. Anti-oxidant activity was carried out using DPPH radical scavenging assay for the methanolic leaf extract. 50% inhibition concentration value of methanolic leaf extract was found to be 144.01 ± 0.33 µg/mL, which was very nearer to the positive control i.e., 133.63 ± 0.41 µg/mL. The results indicated significant antioxidant potential. The plant was proven to be a good source for preparation of drugs from its extracts which can be very beneficial for advancement in medicine, and its further exploration could make it pharmaceutically important plant.

Keywords: *Actinoscirpus grossus var. kysoor*, antioxidant, ethnomedicine, leaf extract, phytocomponents

Introduction

Plants were an important part of ancient folktales. In addition to being used as food and spices, plants have been used as medicines for over 5000 years. The plant kingdom is a great source of potential medicines, and there has been a shared awareness of the significance of medicinal plants in recent years (Thite *et al*. 2013) [26]. These medicinal plants are thought to be a rich source of ingredients for drug production and synthesis. Aside from that, plants are important in the improving standardization of human cultures all over the world. Medicinal plants have a bright future because there are about half a million plants on the planet, most of which have not yet been studied for their medicinal properties (Rasool *et al*. 2012) [21]. Modern medicines rely heavily on drugs extracted from natural resources. Traditional medicinal knowledge, which existed in the form of holy books, incantations, folklore, Materia Medica, and other historic literature, established the preliminary guidelines for the approval of plant-derived natural medicine in the past (Dhami, 2013) [10].

Plant based drugs are easily accessible, inexpensive, safe and effective with fewer side effects. The most obvious alternative for exploring the ongoing quest for therapeutically successful new medicines, such as anticancer drugs, is to look at plants that have been selected for medicinal use for thousands of years (Thite *et al*. 2013) [26]. Due to the unprecedented accessibility of complex chemical substances, a wide range of medicinal plants, their processed constituents, and natural products from medicinal plants offers endless possibilities for the discovery of new drugs and also show beneficial therapeutic potential (Mondal *et al*. 2019) [17].

Traditional herbal medicinal practitioners have identified the therapeutic efficacy of several indigenous plants for various diseases. Synthetic and conventional herbal medicine are indeed derived from natural resources (Bhandary *et al*. 2012) [6]. Phytochemicals have the ability to treat a range of aliments and act as anti-oxidants, contributing to the isolation of novel compounds (Savithramma *et al*. 2011) [23]. Therapeutic action of plants is due to secondary metabolites such as alkaloids, tannins, saponins, glycosides, terpenoids, flavonoids, and phenolic compounds which are the most essential bioactive constituents of plants. The relationship between phytoconstituents and the plant bioactivity is important to understand for the synthesis of compounds with unique activities to treat a variety of health issues and chronic diseases (Visweswari *et al*. 2013; Yadav *et al*. 2014) [28, 27]. The majority of plant-based medicines used by doctors are extracts of the whole plant material or a portion of it. As a result, local medicinal plants that have a suitable biological effect may be standardized and used in a similar way (Audu *et al*. 2007; Koo *et al*. 2018) [4, 15]. Consequently, screening and analysis of plant bioactive components are now needed

for the production of new drugs and the quality control of plant pharmaceuticals. Sample preparation is important for isolating desired components from complex matrices and has a major impact on the accuracy and reliability of plant-derived medicine analysis (Kataoka, 2010) [14].

Exogenous chemicals and endogenous metabolic processes in the human body produce free radicals, or highly reactive oxygen species. These are capable of oxidizing biomolecules such as nucleic acids, proteins, lipids, and DNA and can trigger neurological conditions, cancer, emphysema, cirrhosis, atherosclerosis, arthritis and other degenerative diseases. Antioxidants are compounds that avoid free radicals from invading cells and therefore reduce the risk of disease (Saeed *et al*. 2012; Agatonovic-Kustrin *et al*. 2016) [22, 2]. Almost all species are protected from free radical damage to some degree by antioxidant compounds such as superoxide dismutase and catalase (Dakah *et al*. 2014) [8]. Antioxidant supplements are currently receiving a lot of attention as a way to protect the human body, especially brain tissues, from oxidative damage caused by free radicals. Over the last two decades several medicinal plants have demonstrated such efficacy through conventional psycho-neuropharmacological approaches (Meena *et al*. 2012) [16]. *Actinoscripus grossus var. kysoor* (Robx.) Nolite is a herbaceous plant belonging to family Cyperaceae and is used in Ayurveda as medicinal herb for treatment of various diseases. It is widely used by the conventional practitioners to treat jaundice, fever, nausea, eye diseases but most importantly it is best cardiotonic as it helps in strengthening cardiac muscles. It is a perennial tropical aquatic plant, with the common names of Kaseru (hindi), giant bulrush, greater club rush and rumput menderong (Malaysia), mensiang and walingi (Indonesia) (Al-Baldawi *et al*. 2015) [3]. The plant is mostly found at places where water availability is adequate i.e., at margins of ponds, rivers or at swampy places. The plant is distributed throughout India and china and more or less found in Malaya, Ceylon, and Philippines. This is medium sized herbaceous plant that grows near a water source and has a triangular shaped rising stem that is 3 to 6 feet long. They have grass like leaves that grow to a width of 2 to 3 inches and inflorescence in clusters of small brown spikelets. The flowers are incomplete and actinomorphic. The fruits are small and yellowish brown in color. The rhizomes are blackish in color and have a hair like structure (Tangahu *et al*. 2013; Prashanth, 2017; Digital flora of Gujarat, Unpublished data) [25, 19]. The aim of current study is to perform the preliminary phytochemical screening, quantification of phenols and flavonoids and antioxidant potential analysis of leaf sample of ethnomedicinal plant *Actinoscirpus grossus var. kysoor* (Roxb.) Noltie (Family: Cyperaceae).

Materials and Methodology

Plant material

Leaves of *Actinoscripus grossus var. kysoor* (Robx.) Nolite

Collection of Plant Material

The plant material was collected from Sanand taluka, Ahmedabad district of Gujarat state in the month of February 2021 from the irrigated farm field (23°01'43.0" N 72°22'45.8" E). The collected plant leaves were then washed, air dried for 8 to 10 days, powdered and used for extract preparation.

Extract Preparation Method

Dried powdered sample was weighed and taken in separate conical flasks containing methanol and chloroform solvent and kept on shaker at room temperature for 24 hours. After that solutions were filtered using Whatman number 1 filter paper and allowed it to evaporate at the room temperature. After evaporation dried extracts were obtained and yield is calculated in the form of percentage by given formula.

$$\text{Yield (\%)} = W_1 \times 100 / W_2$$

Where

W_1= Weight of extract after solvent evaporation, W_2= Weight of powdered leaf.

Preliminary Phytochemical analysis

Preliminary screening of phytocomponents present in Methanol and Chloroform extract of leaf of *Actinoscripus grossus var. kysoor* (Robx.) Nolite was carried out by the following tests:

1. **Test for alkaloids:** 30 mg extract dissolved in 30 mL respective solvents (1:1).
   - **Mayer's test:** 2 mL filtrate taken with 1 mL Mayer's reagent; white creamy precipitates show presence of alkaloids.
   - **Wager's test:** 2 mL filtrate in 2mL Wager's solution which is added dropwise from side of test-tube; reddish brown ppt if obtained alkaloid is present.
   - **Hager's test:** 2 mL filtrate with 2 mL Hager's reagent; if yellow ppt are seen then alkaloid is present.
   - **Dragendroff's test:** 1 mL filtrate with 2 mL Dragendroff reagent; orange ppt shows presence of alkaloids.
2. **Test for carbohydrate:** 30 mg extract in 30 mL respective solvents (1:1).
   - **Molish test:** 2 mL filtrate and Molish reagent added dropwise by side; if violet ring is seen then carbohydrate is present.
   - **Fehling's test:** 1 mL Fehling A and B in 1 mL filtrate, boil it for 5 min in water bath; if red ppt is obtained carbohydrate is confirmed.
   - **Barford's test:** 1 mL filtrate and 1 mL Barford's reagent boil for 2 min; red ppt shows presence of carbohydrate.
   - **Benedict test:** 1 mL filtrate and 1 mL Benedict's reagent boil for 2 min; any colored ppt shows presence of carbohydrate.
3. **Test for glycoside:** 30 mg extract in 30 mL respective solvents (1:1).
   - **Bortrager's test:** 2 mL filtrate and 3 mL chloroform shake it and add 10% ammonia solution; pink color shows presence of glycoside.
   - 2 mL filtrate, 2 mL chloroform and add 2 mL acetic acid then add conc. H_2SO_4, then cooled on ice; if color changes from violet to blue and finally green then glycoside is present.
   - **Keller-Killiani test:** 2 mL extract, 1mL glacial acetic acid and 2 drops of 2% $FeCl_3$ solution then pour to test-tube having 1 mL Conc. H_2SO_4; if upper layer is Reddish brown and lower bluish green then glycoside is present.
4. **Test for protein:** 30 mg extract in 30 mL of respective solvent (1:1).

- **Millon's test:** 2 mL filtrate in 1 or 2 mL Millon's reagent; if white ppt is obtained shows presence of protein.
- **Biuret test:** 2 mL filtrate in 2% CuSO4 (0.5 mL) with 1 mL ethanol (95%) and 1 KOH pellet; if pink colored ethanoic layer is seen then protein is present.

5. **Test for phenol:** 30 mg extract and 30 mL respective solvent (1:1).

- **Ferric chloride test:** 2 mL filtrate and 2 drops of 5% $FeCl_3$ solution; if dark green color is seen then phenol is present.
- **Lead acetate test:** 2 mL filtrate in 0.5 mL lead acetate, if white ppt is obtained then phenol is present.
- **Folin-poulten test:** 0.5 mL extract and 1mL Folin-poulten's reagent; if bluish green color is seen then phenol is present.

6. **Test for flavonoid:** 30 mg extract and 30 mL respective solvent (1:1).

- **Alkaline test:** 2 mL extract and 3 mL 2% NaOH; yellow color will appear after adding dilute H_2SO_4, if yellow color disappears then flavonoid is present.
- **Lead acetate test:** 2 mL extract with few drops of 10% lead acetate; if yellow ppt is obtained flavonoid is present.

7. **Test for saponin:** 30 mg extract and 30 mL respective solvent (1:1).

- **Froth test:** 2 mL extract and 20 mL distilled water shaken for 10 min; presence of foam confirms saponin.

8. **Test for fixed oils and fats:** 30 mg extract and 30 mL respective solvent (1:1).

- A small amount of extract is taken between the filter paper and pressed for few seconds; if stain is left on filter paper, then fixed oil is present.

9. **Test for terpenoids:** 30 mg extract and 30 mL respective solvent (1:1).

- **Salkowski test:** 2 mL extract and chloroform added with 3 mL Conc. H_2SO_4; if reddish brown color ring is seen, then terpenoids are present.
- **Copper acetate test:** 1 mL extract and 1 or 2 drops of copper acetate solution; if emerald green color ppt are obtained then terpenoids are present.

10. **Test for cardiac glycoside:** 30 mg extract and 30 mL respective solvent (1:1).

- **Legal test:** 2 mL filtrate in 1 mL pyridine and 1 mL 20% sodium nitroprusside; pink or red color shows presence of cardiac glycoside.

11. **Test for steroids:** 30 mg extract and 30 mL respective solvent (1:1).

- **Liebermann burchard's test:** 1 mL filtrate and 2 to 3 mL acetic anhydride solution; if violet or green color is seen then steroid is present.
- **Salkowski's test:** 2 mg extract shaken with chloroform and add H_2SO_4 side by side; red color shows presence of steroids.

Quantitative analysis

As per requirement different concentration of plant extract were prepared in different vials.

1. 1 mg/1 mL = 0.001 g in 1 mL solvent methanol
2. 0.2 mg/1 mL = 0.0002 g in 1 mL solvent methanol

Concentration used

For standard 0.2 mg/mL methanol

For sample 0.2 mg/mL methanol

Estimation of total phenolic content

For estimation of total phenol content, the method given by Folin-Ciocalteu was followed. For the experiment, 1 mL methanolic extract of leaf sample (0.2 mg mL^{-1}) was used into which 1 mL of Folin-Ciocalteu reagent was added, thereafter 10 mL of distilled water was added to it. After adding distilled water 4 mL of 20% sodium carbonate solution was added and the final volume was made up to 25 mL with the help of distilled water. Further, incubation was given for 30 min in dark and finally the absorbance was recorded at 765 nm in spectrophotometer. The similar procedure was followed for Standard gallic acid (20 µg mL^{-1} to 200 µg mL^{-1}) to obtain calibration curve. The above procedure was repeated 3 times for each sample and standard to avoid errors. The total phenol was estimated as milligrams of gallic acid equivalent/gram of sample (GAE/g of sample) using following equation.

$$GAE = C \times V / M$$

Where,

C = Concentration of gallic acid established from the calibration curve in mg mL^{-1}

V = Volume of the Extract solution in mL

M = Weight of the extract in g

Estimation of total flavonoid content

The total flavonoid content of sample was estimated by the Aluminium chloride ($AlCl_3$) method. 1 mL methanolic leaf extract (0.2 mg mL^{-1}) was mixed with 100 µL 10% aluminium chloride ($AlCl_3$), and then 100 µL of 1M potassium acetate (CH_3COOK); finally add 4.8 mL distilled water and mix well. Thereafter, incubate the test-tube for 30 min in dark at room temperature. At last record absorbance at 415 nm in spectrophotometer. The total flavonoid content was calculated from calibration curve obtained by known concentration of standard Quercetin (20 µg/mL to 200 µg/mL). The experiments were conducted in triplicates to avoid errors. The results were expressed as milligram of quercetin equivalent/gram of sample (QE/g of sample). Which calculated as per given equation.

$$QE = C \times V / M$$

Where,

C = Concentration of quercetin established from the calibration curve in mg/mL

V = Volume of the Extract solution in mL

M = Weight of the extract in g

Antioxidant assay

The antioxidant activity of sample was estimated by DPPH (1, 1-diphenyl-2-picryl-hydrazyl) method with few modifications (Jaberian *et al.* 2013). The fresh stock solution of DPPH (0.04 mg/mL) was prepared in methanol. 1 mL of methanolic leaf extract (20 µg/mL to 200 µg/mL) was mixed with 2 mL of DPPH solution. Then incubation was given for 30 minutes in absolute dark at room temperature. At last absorbance was recorded at 517 nm in spectrophotometer. The Ascorbic acid of same concentration (20 µg/mL to 200 µg/mL) was used as positive control. The test was conducted in triplicates to avoid errors. The results were expressed as IC_{50} value calculated from the plot of percentage inhibition activity vs concentration. The percentage inhibition activity was determined using below equation:

$$\% \text{ Inhibition Activity} = \frac{Absorbance\ of\ the\ Blank - Absorbance\ of\ Sample}{Absorbance\ of\ Blank} \times 100$$

Statistical Analysis

All the experiments were carried out in triplicates to avoid errors. The results were presented as mean ± standard error (S.E.) of three independent replicates. All the statistical analysis and calculation of IC_{50} value was performed using the latest version of GraphPad Prism 7.0 Windows Software.

Results

Extract yield

In the present investigation, cold extraction method used for extract preparation. The results indicate considerable yield of extract obtained for further experiments. The yield of extract obtained in Methanol solvent was higher i.e., 3.165% than chloroform solvent i.e., 0.615%. Methanol leaf extract was light green in color with moderate stickiness while chloroform extract was non-sticky and light yellowish in color.

Yield (%) $=W_1 \times 100/W_2$

Where

W_1= Weight of extract after solvent evaporation,

W_2= Weight of powdered leaf.

Preliminary Phytochemical analysis

Preliminary phytochemical analysis of methanolic leaf extract of *Actinoscirpus grossus var. kysoor* (Robx.) Nolite showed the presence of Alkaloids, Carbohydrates, Proteins, Phenols, Flavonoids, Terpenoids, and Steroids while Saponins and Glycosides are absent (Table 1). The test results of Chloroform leaf extract of *Actinoscirpus grossus var. kysoor* (Robx.) Nolite indicated positive for Alkaloids, Carbohydrates, Phenols, Flavonoids, Terpenoids and Steroids while negative for Proteins, Saponins and Glycosides (Table 1).

Table 1: Preliminary phytochemical analysis of chloroform and methanol extract of leaf of *Actinoscirpus grossus var. kysoor* (Robx.) Nolite

Sr. No	Phytochemicals	Test	Results	
			ME	CH
1	Alkaloids	Mayer's test	+	-
		Wager's test	-	+
		Hager's test	+	+
		Dragendorff's test	+	+
2	Carbohydrates	Molisch's test	+	+
		Fehling test	-	+
		Benedict's test	-	-
		Barfoed's test	-	+
3	Proteins	Millon's test	+	-
		Biuret test	-	-
4	Phenols	Ferric chloride test	+	+
		Lead acetate test	+	+
		Folin ciocalteu test	+	+
5	Flavonoids	Alkaline test	+	+
		Lead acetate	+	+
6	Terpenoids	Salkowski test	+	-
		Copper acetate test	+	+
7	Saponin	Froth test	-	-
		Fixed oils test	-	-
8	Steroids	Liebermann test	+	+
		Salkowski test	+	-
9	Glycosides	Borntrager's test	-	-
		Acetic acid test	-	-
		Keller-kiliani test	-	-

Total phenolic Content (TPC)

The study of total phenol content revealed the standard calibration equation as y = 0.0049x – 0.0971 (R^2 = 0.9892) as shown in Graph 1. Phenol content of leaf sample of *Actinoscirpus grossus var. kysoor* (Robx.) Nolite was calculated using above calibration equation and was found to be 172.17 ± 0.33 mg GAE/g of sample.

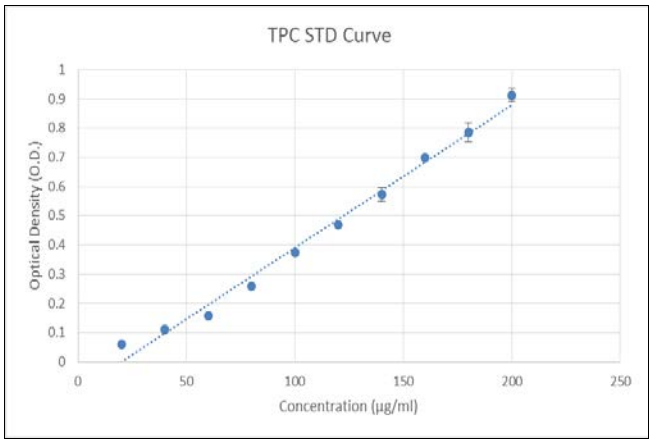

Fig 1: Standard curve of Gallic acid for total phenol content

Total Flavonoid Content (TFC)

Total Flavonoid Content of Leaf sample of *Actinoscirpus grossus var. kysoor* (Robx.) Nolite was found to be 26.66 ± 4.409 mg QE/g of sample, which is calculated using regression equation of standard curve of quercetin i.e., y = 0.0128x + 0.1165 (R^2 = 0.9915) as given in Graph 2.

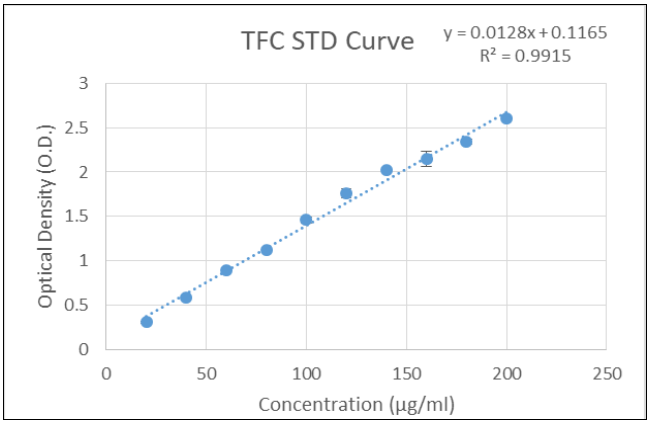

Fig 2: Standard curve of Quercetin for total flavonoid content

Antioxidant Activity

Antioxidant activity of leaf sample was evaluated using DPPH radical scavenging assay. The basic principle of the assay is that DPPH is free radical, which is stable at room temperature and gives purple color in methanol. Antioxidant molecule reduce DPPH molecule to give colorless to yellowish solution, with significant decline in absorbance at 515 nm, which is measured by spectrophotometer. Graph 3 represents the plot between percentage scavenging activity of standard vs sample. In the present investigation results were represented as IC_{50} value i.e., 50% inhibition concentration. The IC_{50} value of positive control Ascorbic acid was found to be 133.63 ± 0.41 µg/mL and IC_{50} value of methanolic leaf extract was found to be 144.01 ± 0.33 µg/mL.

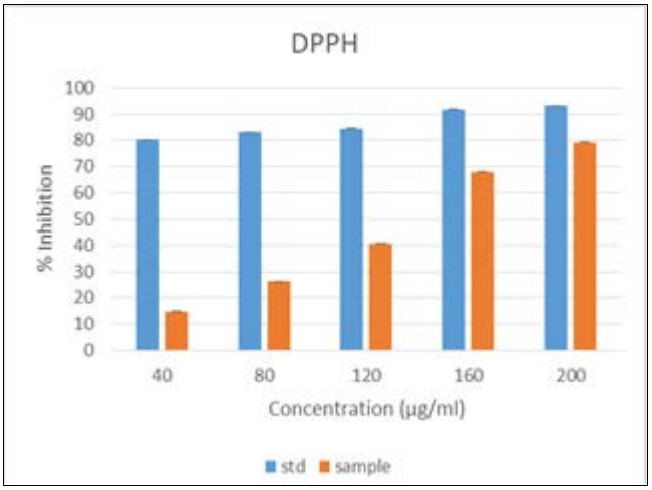

Fig 3: DPPH radical scavenging activity of standard Ascorbic acid and leaf sample of *Actinoscirpus grossus var. kysoor* (Robx.) Nolite

Discussion

The study was performed to determine the secondary metabolite profile, total phenolic content (TPC), total flavonoid content (TFC) and anti-oxidant activity of ethnomedicinal plant *Actinoscirpus grossus var. kysoor (*Robx.) Nolite. Phytochemicals are chemical compounds that are naturally present in plants, providing a variety of Characteristics, That helps to provide immunity to long-term diseases. Alkaloids, flavonoids, tannins, saponins, carbohydrates, glycosides, phytosterols, phenols, protein, amino acids and many other phytochemicals are considered to have a medicinal and physiological functions (Yadav *et al*. 2017) [29]. In our experimental study both methanolic and chloroform leaf extracts shows positive results for alkaloids, carbohydrates, phenols, flavonoids, terpenoids and steroids. Proteins are present in methanolic extracts but not in chloroform extracts. Glycosides, saponins, and steroids are absent in both extracts. The results indicate that *Actinoscirpus grossus var. kysoor (*Robx.) Nolite contained many essential phytocomponents, which can be further used in the nutraceutical and pharmacological industries. The phytochemical screening conducted by Novel and co-workers revealed similar results, as secondary metabolites like flavonoids, tannins, saponins, phenolics, steroids and terpenoids were present in the methanolic extracts of *Actinoscirpus grossus* (Novel *et al*. 2019). Bhardwaj *et al*. 2014 performed quantitative analysis of phytocomponents of *Scirpus articulates*, the results were found to be alkaloids, 0.0265 g/100 g DM, and saponins 0.808 g/100 g DM. Study of Babu and Savithramma, reported that aqueous extracts of *Cyperus rotundus*, *Cyperus esculentus* and *Mariscus alternifolius* contained phytoconstituents such as alkaloids, coumarins, flavonoids, glycosides, lignins, phenols, quinines, saponins, hormones, tannins and terpenoids (Babu, Savithramma, 2014) [5]. According to qualitative phytochemical study, wide diversity of phytochemicals was found in *Cyperus rotundus*. Other study conducted on *Cyperus esculentus* reported higher number of various phytochemicals, including carbohydrates, ketose sugars, tannins, flavonoids and steroids. *Cyperus rotundus* and *Mariscus alternifolius* reported presence of tannins and reducing sugars. Phytocomponents alkaloids, saponins, anthraquinones and terpenoids were absent in the three of these plants (Adeniyi *et al*. 2014).

Phenols are the most essential components of plants. The scavenging capacity of phenolic hydroxyl groups shows a linear relationship between total phenol and anti-oxidant activity of plant species. The flavonoid content of medicinal plants is also equally responsible for their antioxidant potential, as it can scavenge various oxidizing agents (Subedi *et al*. 2014). The results of the present investigation indicated the presence of higher total phenol and Flavonoid content i.e., 172.17 ± 0.33 mg GAE/g of sample and 26.66 ± 4.409 mg QE/g of sample respectively, which is in accordance with many studies. The study conducted by Bhardwaj and co-workers reported prominent amount of total phenol (26.673 mg GAE/100 mg and flavonoid (9.568 µg CE/100 mg) content in *Scirpus articulates* (Bhardwaj *et al*. 2014). The other investigation reported significant phenol content in ethanolic extract of *Cyperus rotundus* (62.72 mg GAE/g extract) (Putri *et al*. 2019). Devendra *et al*. 2013 developed a study of TPC and TFC using gallic acid and quercetin per 100 grams of sample as standard and obtained TPC value 38.89 mg, 40.13 mg and TFC value 4.15 mg, and 4.75 mg in alcoholic and aqueous extracts respectively.The DPPH free radical scavenging assay is a popular method for determining antioxidant activity in plant extracts because it is simple, reliable, and easy to perform. When an antioxidant is present, by acquiring one more electron or hydrogen atom from the antioxidant, the DPPH radical stabilizes molecule, and UV absorbance decreases, indicating the scavenging activity of natural and synthetic compounds (Subedi *et al*. 2014) [24]. The results of the present study showed IC_{50} value of standard was 133.63 ± 0.41 µg/mL and IC_{50} value of methanolic extract of leaf sample of *Actinoscirpus grossus var. kysoor (*Robx.) Nolite was 144.19 ± 0.33 µg/mL. Lower the IC_{50} value of compound indicates stronger antioxidant potential. In present study, we have found the IC_{50} value of sample very close to the standard, indicating stronger radical scavenging ability of the plant. Similar results were obtained in the study conducted by Islam *et al*. 2019, they checked antioxidant activity of *Cyperus rotundus* by DPPH radical scavenging assay. The results indicated that by increasing the concentration of extract, the antioxidant potential was improved, and the IC_{50} value was estimated to be 0.30460 ± 024371 g/mL. In other study on *Cyperus rotundus*, at the concentration of 25, 50, 100 and 250 g/mL, the extract was capable of neutralizing the DPPH free radicals through hydrogen donating activity by 24.96 %, 47.27 %, 76.10 % and 81.27 % respectively (Yazdanparast *et al*. 2007). The presence of these phytocomponents may be the cause of the excellent bioactivities of *Actinoscirpus grossus var. kysoor (*Robx.) Nolite.

Conclusion

The principal objective of this research is preliminary screening of phytochemicals, quantitative estimation of phenolics and flavonoid, and analysis of antioxidant potential of leaf extract of *Actinoscirpus grossus var. kysoor (*Robx.) Nolite. The results show that ethnobotanical plant *Actinoscirpus grossus var. kysoor (*Robx.) Nolite, which have long been traditionally used to combat and cure several disorders and diseases is highly rich in its phytoconstituents. The study confirmed the presence of phytochemicals that play a major role in medical and pharmacological properties. The plant tends to show good phenolic content and flavonoid content by detailed quantitative analysis.

Also, it exhibits potent anti-oxidant activity which is a sign of wealthy medicinal plant. The plant is proven to be a good source for preparation of drugs from its extracts which can be very beneficial for advancement in medicine. The conventional study of this plants will enhance the knowledge of ethnomedicinal plants and to know its active constituents thereby to extract, purify, isolate and characterize phytoconstituents. Advance research is encouraged to understand the mechanism of plant's biological activities and for provision of valuable ideas for future studies.

Declaration

Author Contribution

The first and second author made equal contribution to this paper. Krishnaben Desai performed literature search and drafting of manuscript, while Nainesh Modi read the manuscript thoroughly, gave appropriate comments, and gave final approval.

Conflicts of Interest

The authors declare no conflict of interest.

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