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Research paper

Qualitative and Quantitative description of phenols and flavonoids in the different extracts of *Oxalis corniculata* Linn.

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Abstract: This study is aimed to study the Qualitative and Quantitative content in the plant *Oxalis corniculata* Linn extracts of ethyl acetate and acetone *Oxalis corniculata* L plant is rich in antioxidants, edible leaves, sour in taste and is important to the Ayurveda medicine. Total phenolic content and total flavonoid content was estimated of the plant in the extracts of ethyl acetate and acetone. The phenolic content was estimated with Folin ciocalteu reagent and Gallic acid as standard. Flavonoid content was estimated by colorimetric method in Rutin with different concentrations.
Total flavonoid and phenolic content of *Oxalis corniculata* extracts was observed by using the spectral analysis. The mean and standard deviation was calculated to both the extracts. The observations were recorded in the Tabular form and graphical form.
The phenolic content and flavonoid content of both the extracts of ethyl acetate and acetone was calculated. Both the extracts showed the goodness of phenols and flavonoids. Acetone extract showed more goodness of phenols and flavonoids.
Keywords: Antioxidants, phenols, flavonoids, extracts and *Oxalis corniculata*

INTRODUCTION

Kingdom	-	Planate
Subkingdom	-	Tracheobionta
Division	-	Magnoliophyta
Class	-	Magnoliopsida
Subclass	-	Rosidae
Order	-	Geraniales
Family	-	Oxalidaceae
Genus	-	Oxalis
Species	-	corniculata

Oxalis corniculata L. the creeping wood sorrel is a weed grown in the moist places

and often found in gardens, waste lands,

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roadsides and hedges (Kirtikar and Basu, 1975) It has been reported that Oxalis corniculata plant has presence of flavonoids, tannins, phytosterol, phenol, fatty acid, glycosides and volatile oil. It is also rich in vitamin C, carotene and high content of oxalates. Furthermore the leaves and stem have traces of tartaric, citric acid and malic acid (Kathiriya et. al., 2010; Mizokami et. al., 2008; Khare, 2004)

Phenols and flavonoids are considered as the major source of antioxidants, which inhibit the compounds from oxidation and thus provide the oxidizable matter prolonged life. Antioxidants protect the organism from many diseases which occurs due to the oxidization. Flavonoids have polyphenolic structure classified in different categories. Phenols and flavonoids are present in plants which give the pigmentation to the plants and provide the protection to them from different external harmful agents (Sies, 1997). In the daily food polyphenols are found abundantly in the form of antioxidants, which constitute a number of compounds. Phenols are present in many dietary substance like the presence of phenols in the *Fragaria* x *ananassa* Duch has high valve of polyphenols like glucoside, 3,4,5-trihydroxyphenyl-acrylic acid, glucose ester of (E)-p-coumaric acid, and ellagic acid, which can show the antiproleferative properties in the human cancer cells (Zhang et. al., 2008) Similarly the other berries also have the high content of the phenols were observed like anthocyanins, flavonols, flavanols, ellagitannins, gallotannins, proanthocyanidins, and phenolic acids (Seeram et. al., 2006).

Flavonoids have antioxidant, anti-inflammatory, antiallergenic, anticancer and anti microbial activity revealed from the recent research (Hertog et. al., 1992). Flavonoids are also plant secondary metabolites with polyphenolic structure. The flavonoids are present in our day today diet and about 6000 have also been reported in many higher plants also (Manach et. al., 2004; Dahan and Altman, 2004; Tolonen, 2002; Austin and Noel 2003).

There are so many antioxidants in the form of flavonoids like quercetin, kaempherol, catechins, apigenin etc. The studies upon the flavonoids revealed that there is inverse relation between flavonoid intake and the chronic diseases incidences for example coronary heart diseases as evidences suggests that availability of many flavonoids in the biological compound is poor and plasma values are very low. However by increasing the intake of the flavonoids can decrease the damage due to the oxidative stress (Serafini et. al. 1996; Stein et. al., 1999).

MATERIAL AND METHODS

Total phenol: The total amount of phenol in the extracts was estimated with Folin ciocalteu reagent. Gallic acid was used as a standard and the total phenol was expressed as mg/g gallic acid equivalent (GAE). A series of concentration 0.01, 0.02, 0.03, 0.04 and 0.05mg/ml was prepared in methanol. Concentration of 0.1 and 1mg/ml of plant extract were also prepared in methanol and 0.5 ml of each sample were introduced into test and mixed with 2.5ml of a 10 fold diluted folin ciocalteu reagent and 2ml of 7.5% sodium carbonate. Incubated period for 30 minutes at room temperature before the absorbance was measured at 765nm spectrophotometrically. The folin ciocalteu reagent is sensitive to reducing compounds and polyphenols and produces blue colour

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upon the reaction. Then this blue colour is measured spectrophotometrically. Line of regression from Gallic acid was used for the estimation of phenolic content of the test sample (Verza et. al., 2007; Habila et. al., 2010).

Total flavonoid content: The flavonoids content was estimated by colorimetric method. Different concentrations of Rutin (10 to 100µg/ml) in methanol were prepared. The test sample was prepared in the methanol (100µg/ml) and mix 0.5 ml aliquot of appropriately diluted sample solution with 2ml of distilled water and subsequently with 0.5ml 0f a 5% $NaNO_2$ solution. After waiting for six minutes add 0.15 ml 0f $AlCl_3$ solution and again allow standing for six minutes, after then adding 2ml of 4% NaOH solution to the mixture. Following this, immediately add water to bring the final volume to 5ml, and then mix the mixture thoroughly and allowed to stand for another 15 minutes. The absorbance was taken at 510nm verses prepared water blank. The absorbance of test sample in the line of regression of standard curve of Rutin was taken and total flavonoids calculated (Lobo et. al.,, 2011).

RESULT AND DISCUSSION:

Total phenolic content: In this experiment the total phenolic content of the ethyl acetate and acetone extract of the *Oxalis corniculata* L. was estimated with reference to the gallic acid equivalent. The absorbance values of gallic acid in different concentration is sown in the table 1 and the graphical representation is expressed in the graph 1 and the total phenolic content of the ethyl acetate and acetone extracts of *Oxalis corniculata* L. was estimated using the spectral analysis. The mean and standard deviation of the Ethyl Acetate extract were measured as 376.6667 and 7.023769 respectively. The mean and the standard deviation of the acetone extract were measured as 415.3333 and 0.416333. The total phenol estimation at the different absorbance is shown in the table 2 and table 3. In the present study of *Oxalis corniculata* L. the phenolic content was estimated by using Folin ciocalteu reagent with reference to the standard gallic acid. The folin ciocalteu make the colour complexes with the phenol hydroxyl groups of the extract and the absorbance was measured UV-Vis spectroscopy. Among the two extracts the Acetone extract showed the highest value of the phenols. This may be due to the greater polarity of Acetone than the Ethyl acetate. The concentration of the standard using the gallic acid was taken as (10, 20, 30, 40, 50) µg/ml give the absorbance (0.1042, 0.1703, 0.2426, 0.2911, 0.3187) respectively using the spectrophotometric analysis. The increase in the concentration of the extract in the experiment revealed the growth of phenol content in the plant.

Table 1: Total Phenolic Standard Estimation of the Gallic Acid

S No.	Concentration	Absorbance
1.	10	0.1042
2.	20	0.1703
3.	30	0.2426
4.	40	0.2911
5.	50	0.3187

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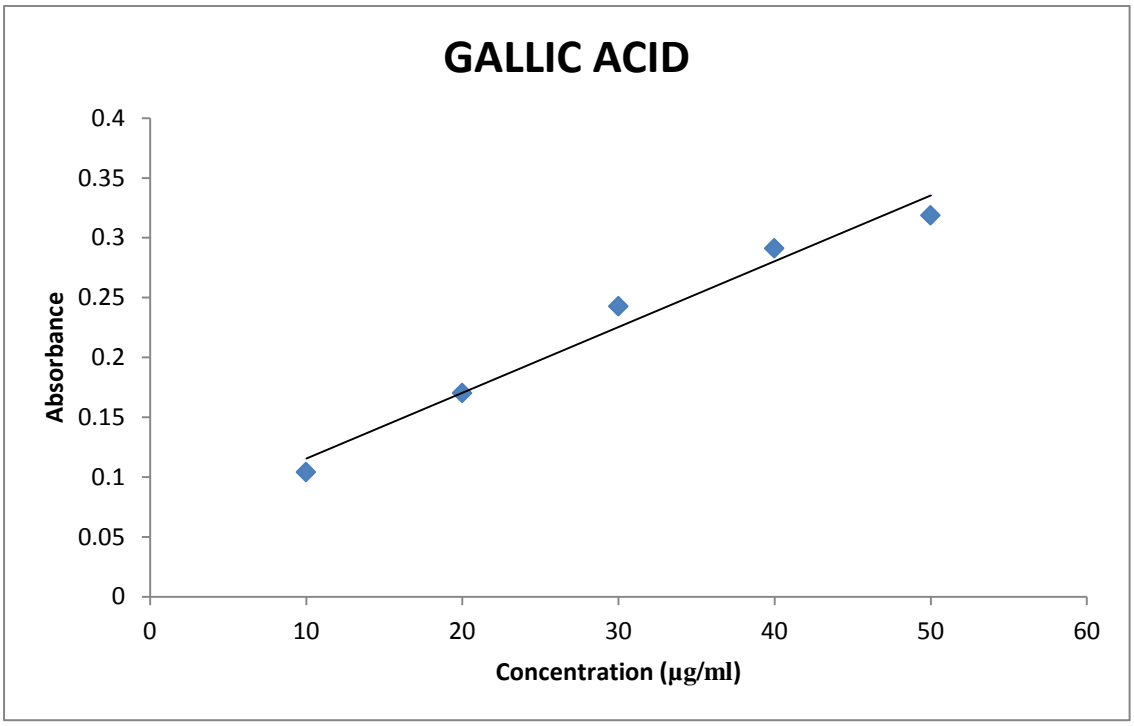

Graph 1: Standard Curve of the Total Phenolic Content of the Gallic Acid

Table 2: Total Phenolic Content Estimation of Ethyl Acetate Extract of *Oxalis corniculata* L.

S. No.	Absorbance	Concentration	TPC (mg/g)
1	1.94	1mg/ml	376
2	1.98	1mg/ml	484
3	1.91	1mg/ml	370

Mean = 376.6667
Standard Deviation = 7.023769

Table 3: Total Phenolic content estimation of Acetone extract of *Oxalis corniculata* L.

S. No.	Absorbance	Concentration	TPC (mg/g)
1	2.136	1mg/ml	415.2
2	2.139	1mg/ml	415.8
3	2.135	1mg/ml	415

Mean = 415.3333
Standard Deviation = 0.416333

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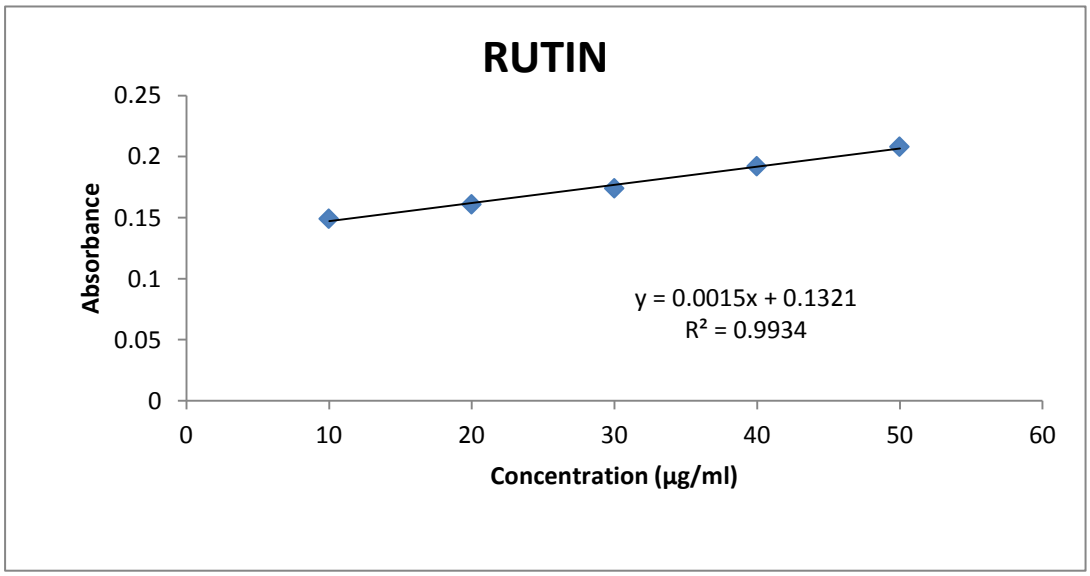
Total Flavonoid content:

The total flavonoid content of the ethyl acetate extract and acetone extract of Oxalis corniculata Linn was estimated using the Rutin as the standard curve is shown in the Table 4 the estimation of extracts of ethyl acetate extract and acetone Table 5 & 6 and is expressed in the graph 2. The line of regression was estimated from the Rutin. y = 0.001 x + 0.132 and the value or R^2 is 0.933. The mean of both the two extracts values of the total flavonoid content of ethyl acetate extract and acetone extract is 100.6667 and 165.333mg/g respectively and standard deviation of ethyl acetate and acetone are 1.527525 and 0.57735. The goodness of flavonoid was found good by putting the (y=50) in the line of regression of rutin mentioned in the graph 2. In this observation among the two extracts the flavonoid content was also found more in the Acetone extract. Like in the observation of phenols, flavonoids were also found in the acetone extract of *Oxalis corniculata* L more. As mentioned earlier flavonoids are also the polyphenols. This study clearly illustrates that the *Oxalis corniculata* L is rich source of flavonoids which are mostly considered as the antioxidants.

Table 4: Total Flavonoid Content Using Standard Rutin

S. No.	Concentration	Absorbance
1.	10	0.149
2.	20	0.161
3.	30	0.174
4.	40	0.192
5.	50	0.208



Graph 2 : Total Phenolic Content Estimation of Standard Using Rutin

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Table 5: TFC of the Ethyl Acetate Extract of the *Oxalis corniculata*

S. No	Absorbance	Concentration	TFC (mg/g)
1.	0.231	1mg/ml	99
2.	0.234	1mg/ml	102
3.	0.233	1mg/ml	101

Mean = 100.6667
Standard deviation = 1.527525

Table 6: TFC of the Acetone Extract of the *Oxalis corniculata* L.

S No.	Absorbance	Concentration	TFC (mg/g)
1.	0.298	1mg/ml	166
2.	0.297	1mg/ml	165
3.	0.297	1mg/ml	165

Mean = 165.333
Standard deviation = 0.57735

Conclusion: Total phenolic content estimation was also done to the two extracts. Phenols are the group of secondary metabolites in the plant and polyphenols are the most abundant in the diet of day today life. In this plant *Oxalis corniculata* Linn the phytochemical investigation showed the presence of phenols. To know the quantity of phenols the experiment was done to calculate the most appropriate value of phenols in this plant. The estimation was done by using by using Folin ciocalteu reagent with reference to the standard gallic acid. Then the estimation was carried in two extracts of Ethyl acetate extract and acetone extract Total estimation of phenols was noted 376.6667 mg/g, 415.3333mg/g in ethyl acetate extract and acetone extract respectively. The estimation of phenols was observed by measuring the absorbance on the UV-Spectrophotometer. Acetone extract has most content of phenol.
Flavonoids are also the secondary metabolites in the plants with polyphenolic structures. Like the estimation of phenol Total flavonoid content of *Oxalis corniculata* Linn was observed in the extracts of ethyl acetate and Acetone extract. The absorbance of the all the extracts was recorded using the Spectrophotometer. The total flavonoid content in the *Oxalis corniculata* L. extracts was calculated as 100.6667, 165.333 and 219.6667mg/g in ethyl acetate extract, acetone extract and methanol extract respectively. In this study the methanol also show the highest content of flavonoids.

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