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PHARMACOGNOSTIC, PHYTOCHEMICAL, ANTIOXIDANT AND ANTIBACTERIAL ACTIVITTY STUDIES ON *BEGONIA PICTA*.

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ABSTRACT

The aim of the present study is to extend the scientific knowledge for utilization of traditionally used medicinal plant *Begonia picta*. It includes the macroscopic, microscopic, phytochemical studies, antioxidant and antibacterial activity evaluation of leaves and stems of *Begonia picta*. The transverse section (T.S) of leaves showed the presence of upper and lower epidermis, mesophyll and mid rib region with numerous vascular bundle. The epidermal layer of leaf shows the presence of anisocytic type of stomata. The T.S of stem showed the epidermis, cortex, vascular bundle arranged in ring and pith with parenchymatous cells consisting abundant starch grains. Phytochemical present in different extract of *Begonia picta* were alkaloid, tannin, saponnin, terpenoid, glycoside, carbohydrate, flavonoid, phenol, cardiac glycoside and anthraquinone glycoside. TPC was measures by using Folin-ciocalteau's reagent. And TFC of *Begonia picta was* measured by colorimetric assay. The TPC and TFC of the extracts were expressed as milligram of Gallic Acid Equivalent per gram of extracts i. e. mg GAE/g extract and milligram of Quercetin Equivalent per gram of extract i. e. mg QE/g extract respectively. The result of the present study revealed that the ethyl acetate extract of *Begonia picta* has highest TPC (66.994 mg GAE/g) and hexane extract of *Begonia picta* has highest TFC value (33.3617 mg QE/g) of extract. Antioxidant activity was determined by 1, 1-diphenyl-2-picryl hydrazyl (DPPH) scavenging method. Inhibitory concentrations (IC_{50}) were calculated. The sequence of antioxidant activity of *Begonia picta* extracts were; ethyl acetate (with IC_{50} value 40.949µg/ml) > methanol (IC_{50} value 45.7184µg/ml) > hexane (IC_{50} value 248.365µg/ml).

Antibacterial activity was evaluated by cup diffusion method in which only ethyl acetate extract *Begonia picta* showed the indicative antibacterial activity against *Salmonella typhi.*

KEYWORDS: *Begonia picta,* polyphenol, flavonoid, antioxidant, antibacterial.

INTRODUCTION

In spite of great advance of modern scientific medicines, traditional medicines is still the primary form of treating diseases for majority of peoples of in developing countries, even among those to whom western medicine is available, the number of people using one form or another of complementary or alternative medicine is rapidly increasing worldwide. Increasing knowledge of metabolic process of and effect of plant on human physiology has enlarged the range of application of medicinal plant.[1] Nepal located in the center of the Himalayan range place the country in the transitional zone between western and eastern Himalaya. Nepal is rich in both biological and cultural diversity. Despite having immense potentialities to promote public health as well as to capture the national and international market the country is still far behind the to grab the opportunities utilizing available resources.[2] The plant and plant resources for medicinal use are collected haphazardly. If the trend of utilization of plant and plant resources remain same we are in a danger of losing them forever. So that priority should be given to the documentation of indigenous knowledge and conservation should be done for the existing species and habitats of them before some of these are eliminated from the area.[3] *Begonia picta* is native plant of Himalayan region of Nepal and India.[4] [5] [6] Documentation of indigenous plant through knowledge of ethno botanical studies and scientific knowledge is very important today. Further scientific and systemic explorations regarding the utilization of medicinal herbs have great contribution for value addition in indigenous plant.[7]

Begonia is the sixth largest genus of flowering plants.[8] The large genus *Begonia* has around 750 species in Asia, with the bulk occurring in Southeast Asia, and Malaysian region having 44 of these.[9] In Nepal 29 species of the genus *Begonia* is pantropically distributed. The taxonomic history of *Begonia* in Nepal began with the description of *Begonia picta* by Sir J.E Smith in *Exotic Botany* (1805), based on the specimen collected by Buchanan-Hamilton (1802-103) from Nepal. Two species *Begonia picta* and *Begonia dioica* are the most common species in Nepal. The vertical distribution of *Begonia* species in Nepal ranges from 500m - 4500m, although most species are found in the ranges of 500m-2500m in warm temperate and subtropical belt. The majority of *Begonia* species are shade loving succulent

hydrophilous herbs, and hence the availability of water and how to cope with its seasonal absence are excepted to be major determinants to the shaping of distribution of genus in the area with strongly monsoonal climates such as Nepal.[6,10]

Traditionally *Begonia picta* (magarkannche) is used in pained nipple in the form of wild herb/ whole plant. The juice whole plant is taken to relieve headache and also consumed in treatment of peptic ulcer. The paste is applied to stop bleeding from cuts and wound and is applied externally on ringworm and scabies. The root juice is used as eyes wash to treat conjunctivitis.[2, 11, 12] The whole plant is feed to sterile animals to help them conceive. Whole plant is used as appetizer and juice of leaves about 4 teaspoonfuls 3 times a day is given to relieve the fever.[13] Plant decoction is used in colic and dyspepsia. Juice of *Begonia picta* was used as slight venom. Other species of *Bego*nia i.e. *Begonia nepalensis* is used as anthelmintic in Nepal.[14] *Begonia picta* was being eaten raw or as pickle by Gurungs and adjoining areas of Pokhara. The leaves have an acidic taste and are eaten raw as well as cooked for its delicious, sour taste in Palpa. This result is also supported by similar findings of the species being consumed as 'Chatni (kind of pickle)' by the local people in Daman and Dolakhash shrestha k. Paste of young shoot also taken for respiratory tract infections. Begonia picta also called patherchattha in india is used in dysentery and mouth ulcer.[15]

MATERIAL AND METHODS

Collection and identification

The plant material i.e. leaves and stems were collected from Godavari Kunda Samudayic Ban Upabhokta Samuha Ward No. 5 Lalitpur, Nepal. During June/July 2014 and was duly identified as *Begonia picta* in National Herbarium and Plant Laboratory, Godavari, Lalitpur.

Pharmacognostic studies

The pharmacognostical study of the *Begonia picta* was performed to find out the characteristic morphological and anatomical features of crude drug material, which helps in identification and to prevent the adulteration. Pharmacognostic study includes macroscopic and microscopic study where macroscopic study was performed by observation of the external features such as color, odor, taste, surface texture, fracture etc. as sensed by organoleptic evaluation. Microscopic study was performed by cutting the transverse section of leaf and stem and was observed under the microscope to identify different anatomical feature with special focus to presence of distinct cells, tissues and crystals and their

arrangement. Permanent slides of each transverse sections and vertical sections were prepared.[16, 17]

Processing of samples

Plant materials collected were dry-cleaned and the foreign organic material (FOM) was separated. They were shade dried and grinded to obtain the powder with the help of electric grinder.

Preparation of extract

The powder form of sample of 15.24g was taken and subjected to soxhlet extraction. Three different solvent were chosen to run extraction process as per their polarity i. e Hexane, ethyl acetate and methanol. Different liquid extract obtained were dried separately using Rotavapour drier below 40^{o}c and solid extracts were preserved in refrigerator at 4^{o}c. Extractive value of each extract were determined.

Phytochemical Screening

Phytochemical screening included the qualitative tests performed by color reactions and quantitative estimation includes TPC and TFC determination of different extract of plant.

Qualitative phytochemical screening

The phytochemical screening was done to identify the main group of chemical constituents present in different extracts by their color reactions with different reagents. Each extract was subjected for glycoside, alkaloids, tannins, saponin, terpinoids, carbohydrate, cardiac glycoside, anthraquinone glycoside, flavonoid, phenol. These tests are done by following the methods found previous studies.[18-20]

A. Total polyphenolic content determination

The total polyphenolic content of the extracts were measured using Folin-ciocalteau's reagent. Briefly 0.5ml of extract (5mg/ml) was separately mixed with Folin-ciocalteau's reagent (5ml, 1:10 v/v diluted with distilled water and aqueous sodium carbonate (Na_2co_3, 4ml, 1M) solution. Then the mixture was allowed to stand for 15 minutes at room temperature. The absorbance of the reaction mixture was measured at 765 nm using spectrophotometer; Gallic acid was used for constructing the standard curve (10 to 80µg/ml) and total polyphenolic compound concentration in the extract was expressed as milligrams of Gallic acid equivalent per gram of dry weight (mg GAE/g) of extract.[21-23]

B. Total flavonoid content determination

Total flavonoid content of the extracts was determined according to the colorimetric method. Briefly 0.5 ml of each extract (50mg/ml) was separately mixed with 1.5 ml of methanol, 0.1 ml of almunium chloride (AlCl3, 10%). Subsequently 0.1 ml of 1M potassium acetate and 2.8 ml distilled water was added to each test tube and reaction mixture was allowed to stand for 30 minutes. The absorbance was measured at 415 nm with UV-visible spectrophotometer. Quercetin was used for construction of standard curve (10 - 50 µg/ml) and the total flavonoid compounds concentration in the extracts was expressed as milligram of Quercetin equivalent per gram of dry weight (mg QE/g) of extract.[24, 25]

Antioxidant Activity by DPPH Scavenging

The DPPH is a stable free radical and is widely used to assess the radical scavenging activity of antioxidant component. This method is based on the reduction of DPPH in methanol solution in the presence of a hydrogen donating antioxidant. The free radical scavenging activity of all the extract was evaluated by 1, 1-diphenyl-2-picryl hydrazyl (DPPH) according to the previously reported method. Briefly, 0.1mM solution of DPPH in methanol was prepared, and 1mL of this solution was added to 3 mL of the solution of all extracts in methanol at different concentration (5µg/ml, 20µg/ml, 40µg/ml, 60µg/ml, 80µg/ml and 100µg/ml). The mixtures were shaken vigorously and allowed to stand in dark room at temperature for 30 minutes. Then the absorbance was measured at 517 nm using a UV-VIS spectrophotometer (UV-1800 SHIMAZU). Ascorbic acid was used as the reference. Lower absorbance values of reaction mixture indicate higher free radical scavenging activity. The capability to scavenging the DPPH radical was calculated by using the following formula.

DPPH scavenging effect (% inhibition) = $(A_0 - A1)/A_0)*100$

Where, A_0 is the absorbance of the control reaction, and A1 is the absorbance in presence of all of the extract samples and reference. All the tests were performed in triplicates and the results were averaged. The % scavenging was then plotted against concentration and regression equation was obtained to calculate IC50 (micro molar concentration required to inhibit DPPH radical formation by 50%) values.[26-28]

Antibacterial screening of extracts

Antibacterial activity of *Begonia picta* hexane, ethyl acetate and methanol extracts were determined by the cup diffusion method on nutrient agar medium. Cups are made in nutrient agar plate using cork-borer of 6mm. Inoculum containing 10^6 CFU/ml of bacteria were

spread on the solid plates with a sterile swab moistened with the bacterial suspension. Then 50µl of the each extract were placed in the cups made in inoculated plates, the treatments also included 50µl of DMSO which served as negative control. All the plates were incubated for 24 h at 37°C and zone of inhibition if any around the wells were measured in mm (millimeter). Antibiotics (50µg) Ofloxacin was used as reference to determine the sensitivity of each bacterial species tested.

Microorganism taken were; Gram positive organism: *Staphylococcus aureus* (ATCC 25923), *Bacillus cereus* (clinical isolated) and Gram negative organism: *Escherichia coli* (ATCC 259222), *Salmonella typhi* (clinical isolated).[29, 30]

Determination of minimum bactericidal concentration (MBC); Extract Zone of having inhibition (ZOI) $\geq$ 12 mm was subjected to MBC test. Freshly prepared nutrient broth was used as diluents. Crude extract was diluted by two fold serial dilution method. 13 tubes were taken. 50µg/ml of the standard culture inoculum was added to each test tube except the negative control tube. All tubes were incubated at 37°C for 24 h. The tube content was subculture in fresh nutrient agar separately and MBC was determined as that showing no growth.[30]

Data analysis

Data were analyzed using MS-EXCEL 2010. Quantitative tests were conducted in triplicate. The data was presented in form of mean ± SD (standard deviation).

RESULTS

Foreign organic material determination

First of all the plant materials were dry-cleaned. FOM value (%) was determined. Cleaned plant materials were taken and placed over white paper in 5 part, each part contain 50gm. Foreign organic material (FOM) was separated from each part. Weight of FOM was found to be 3.25g in total 250g *Begonia picta* leaves. Calculated FOM value was 1.3%.

Macroscopic study

Stem was herbaceous, about 2 to 8 cm long in length, simple round, weeping and throwing out fibrous roots at its joints and almost white to reddish in color with acidic taste. Leaves are few on long round footstalks, heart shaped, pointed, veiny, very rugged, and doubly serrated, most purple color beneath. All the leaves have an acid taste. Stipules small in pairs, broad at

the base, acute, permanent, pressed to the stem. General appearance of *Begonia picta* is shown in picture below.

Figure 1: General appearance of *Begonia picta*

Microscopic study

Transverse section of the leaf of *Begonia picta* showed the single layered barrel shaped upper and lower epidermis. Lower epidermis consist numerous anisocytic type of stomata. Beneath the upper epidermis mesophyll composed by parenchymatous cells are present which are not differentiated into the palisade parenchyma and spongy parenchyma. The mid rib region consist of numerous vascular bundles with distinct vessels. Diameter of different cells observed in T.S of leaf: upper epidermis 49.94 µm, lower epidermis 38.54 µm, parenchyma of mesophyll 70.5 µm and vessels of vascular bundle 22.56µm measured by microscope (10x) fitted with ocular micrometer.

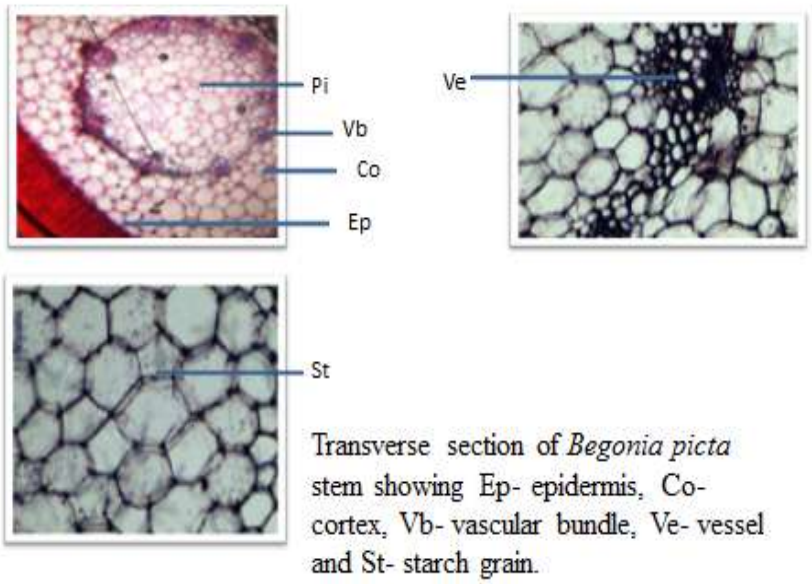
Transverse section of stem of *Begonia picta* showed the single layered upper and lower epidermis. Beneath the upper epidermis the cortex region is present which consist of 2 to 8 layers of collenchyma cells and 5 layers of parenchyma cells. Vascular bundles are arranged in a ring and are about 8 in number. Distinct vessels are present in vascular bundle. Pericycle is indistinct.

Large pith which is composed of parenchymatous cells is present in innermost part. Abundant starch grains which are minute rounded shaped are present throughout the parenchymatous cells. Diameter of different cells observed in T.S of stem: collenchyma 56.4 µm, parenchyma

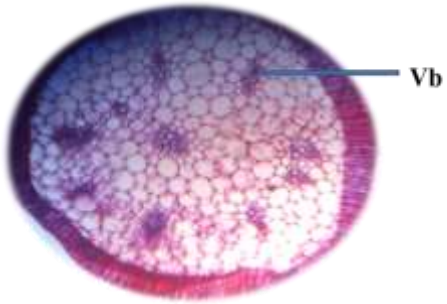
of cortex 175.78 µm, vessels of vascular bundle 39.48 µm, parenchyma of pith 141 µm and starch grains 15.04 µm measured by microscope (10x) fitted with ocular micrometer.

Transverse section of petiole of *Begonia picta* showed that the epidermis is modified into columnar cells. A columnar collenchyma is present. Large central portion of parenchymatous cell scattered with 10 smaller vascular bundles in a ring surrounding a quite large vascular bundle in its center. In each vascular bundle 3 vessels are distinct. Calcium oxalate crystals are present in few cells of parenchyma and starch grains are present in the parenchymatous cells. Diameter of different cells observed in T.S of petiole: central parenchyma 110.92 µm, vessels of vascular bundle 27.26 µm and calcium oxalate crystal 16.92 µm measured by microscope (10x) fitted with ocular micrometer.

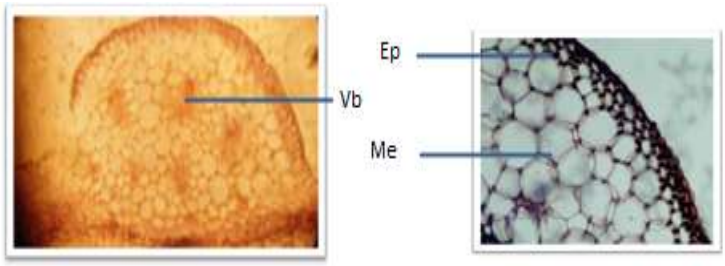
Some figures of T.S of leaf and stem of *Begonia picta* were shown as below:



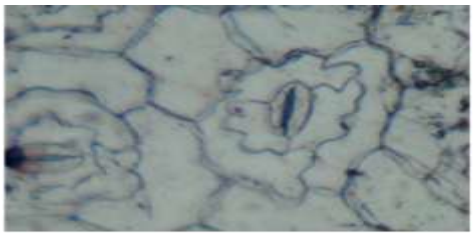
Transverse section of *Begonia picta* stem showing Ep- epidermis, Co- cortex, Vb- vascular bundle, Ve- vessel and St- starch grain.



T.S of *Begonia picta* petiole showing Vb-Vascular bundle



Transverse section of *Begonia picta* leaf showing Ep- epidermis, Me- mesophyll and Vb- Vascular bundle



Epidermal layer of *Begonia picta* showing anisocytic type of stomata

Qualitative phytochemical screening

Phytochemical Screening of different extracts of *Begonia picta* showed the presence of different group of active constituents in hexane, ethyl acetate and methanol extracts. The results obtained were tabulated as follows. As per result hexane extract contained alkaloids, tannin, carbohydrates and glycosides. The ethyl acetate extract contained tannins, flavonoid and carbohydrates. And methanol extract contained saponnins, tannins, terpinoids, carbohydrate, flavonoid, glycosides, cardiac glycosides and anthraquinone glycosides.

Table 1: Result of qualitative phytochemical screening

S.N	Test	Hexane	Ethyl acetate	Methanol
1	Alkaloids	+	-	-
2	Saponins	-	-	+
3	Tannins	+	+	+
4	Terpinoids	-	-	+
5	Carbohydrates	+	+	+
6	Flavonoid	+	+	+
7	Glycosides	-	-	+
8	Cardiac glycosides	-	-	+
9	Anthraquinone glycosides	-	-	+
10	Phenol	+	+	+

Notes: (+) indicates presence of phytochemical (-) indicates absence of phytochemical.

Quantitative phytochemical screening

A. Total polyphenolic content determination

Calibration curve of standard Gallic acid was obtained by Microsoft Excel 2010 where graph was plotted by keeping concentration in x-axis and absorbance in y-axis as shown in figure.

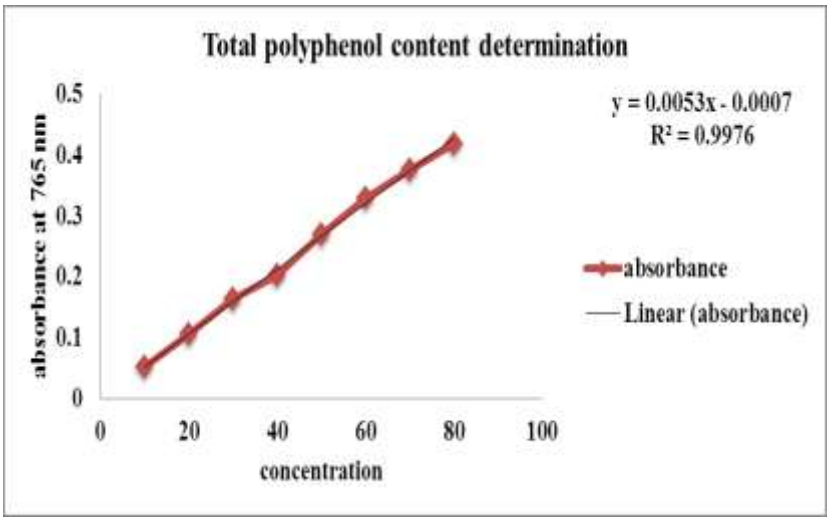


Figure 2: calibration curve of Gallic Acid.

Calculation of total polyphenolic content of the extract was done by using calibration curve equation: y= 0.0053x-0.0007, R^2= 0.9976 obtained by plotting calibration curve of standard Gallic acid where y was the absorbance and x was the concentration. The following bar diagram shows the total phenolic content of different extracts as mg Gallic acid equivalent (GAE) per gram.

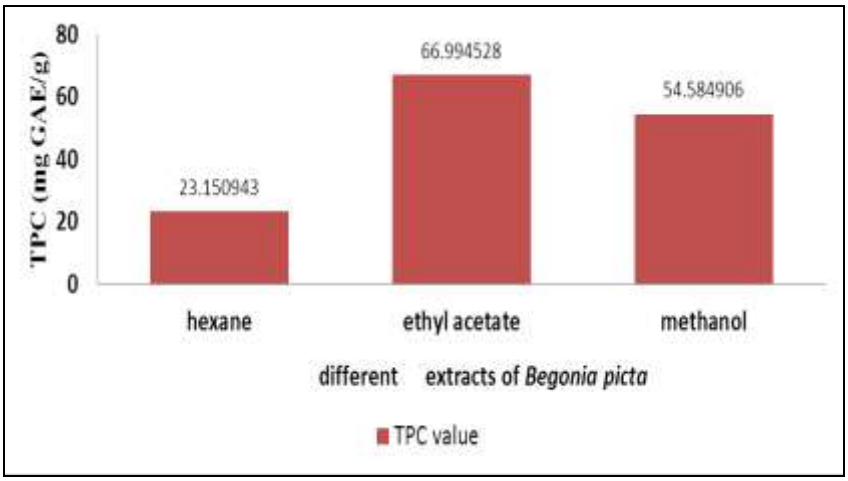


Figure 3: Total phenolic content of different extracts of *Begonia picta* (mg GAE/g).

Total flavonoid determination

Calibration curve of standard Quercetin was obtained by Microsoft Excel 2010 where graph was plotted by keeping concentration in x-axis and absorbance in y-axis as shown in figure.

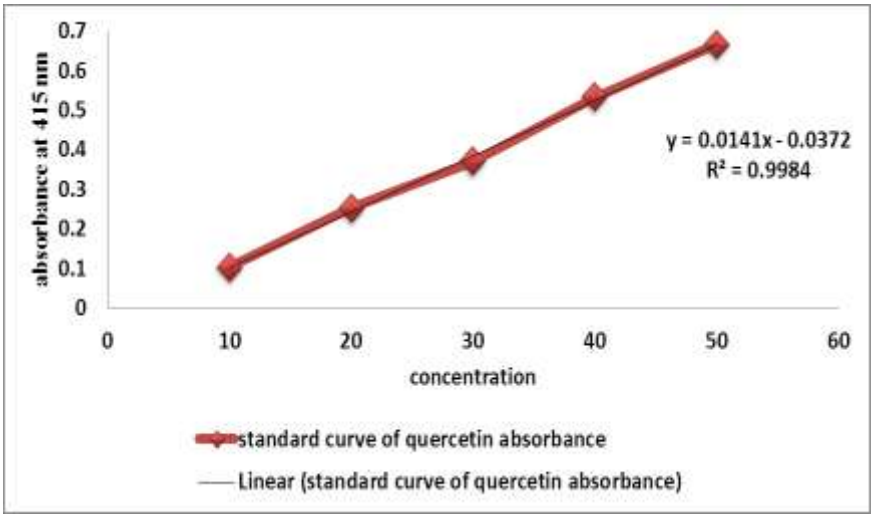


Figure 4: Calibration curve of Quercetin.

Calculation of total flavonoid content of the extract was done by using calibration curve equation: y = 0.0141x-0.03727, R^2 = 0.9984 obtained by plotting calibration curve of standard Quercetin where y was the absorbance and x was the concentration. The following bar diagram shows the total flavonoid content of different extracts as mg Quercetin equivalent (QE) per gram.

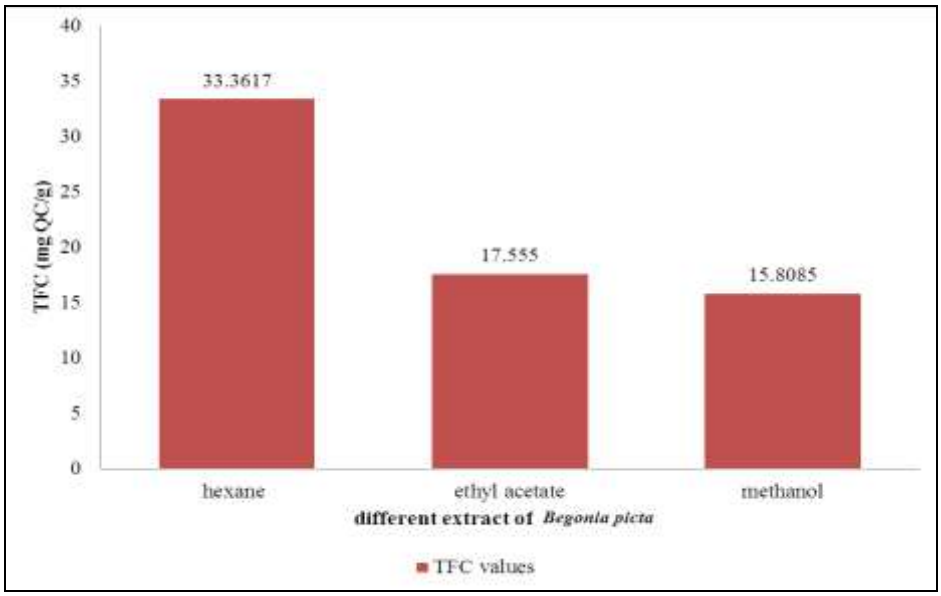


Figure 5: Total flavonoid content of different extracts of plant *Begonia picta* (mg QE/g).

Table 2: TPC determination of *Begonia picta* extracts

Extracts	absorbance	mean ± SD	TPC
Hexane	0.12	0.1223±0.00208	23.150943
	0.124		
	0.123		
Ethyl acetate	0.358		
	0.352	0.354± 0.003055	66.994528
	0.356		
Methanol	0.289		54.584906
	0.285	0.290± 0.005568	
	0.296		

Table 3: TFC determination of *Begonia picta* extracts

Extracts	Absorbance	mean ± SD	TFC
Hexane	0.452		
	0.437	0.433± 0.016	33.362
	0.42		
Ethyl acetate	0.123		
	0.209	0.21033± 0.016	17.555
	0.209		
Methanol	0.179		
	0.19	0.185± 0.016	15.8085
	0.188		

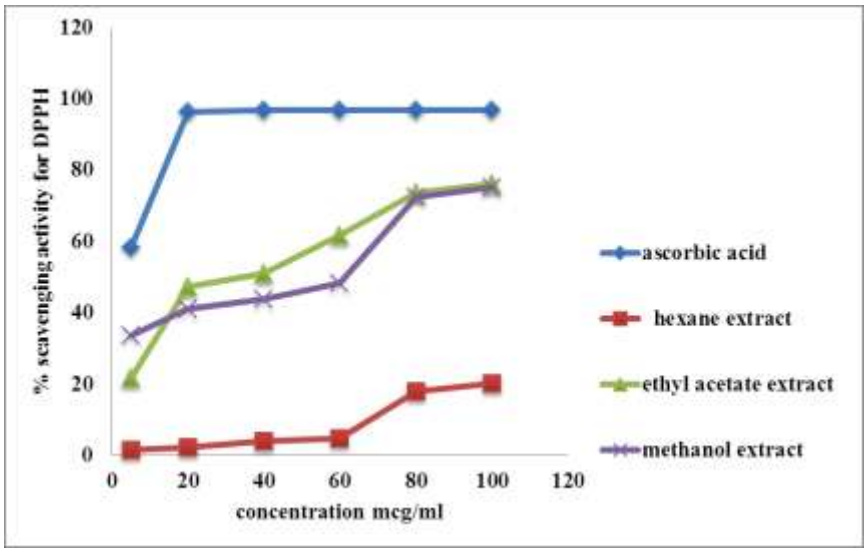


Figure 6: DPPH scavenging activity of different extracts of *Begonia picta.*

Table 4: Percentage scavenging activity of ascorbic acid

Concentration (µg/ml)	ascorbic acid
5	58.246
20	96.392
40	96.906
60	96.906
80	96.906
100	96.906

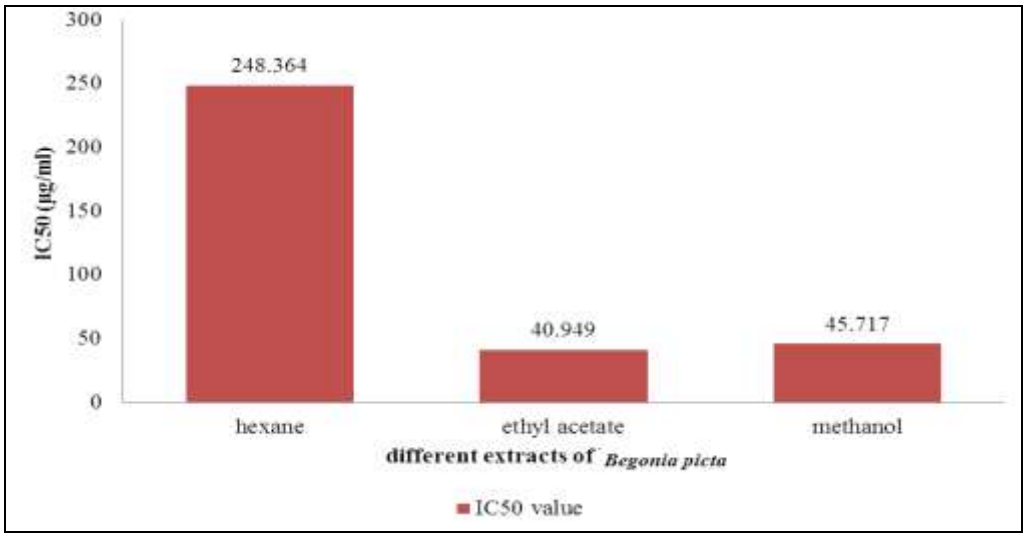


Figure 7: IC_{50} values of different extracts of *Begonia picta*

IC_{50} values of tested samples were in order: ethyl acetate extract < methanol extract < hexane extract of *Begonia picta.*

Table 5: Antioxidant activity showed by *Begonia picta* extracts

Concentration (µg/ml)	Absorbance; mean ± SD		
	Hexane	**Ethyl acetate**	**Methanol**
5	0.388±0.00172	0.309±0.001	0.292±0.00172
20	0.385±0.00252	0.208±0.0014	0.232±0.00153
40	0.378±0.00252	0.193±0.002	0.227±0.00172
60	0.375±0.00350	0.151±0.0014	0.203±0.001
80	0.323±0.0107	0.104±0.0012	0.109±0.00114
100	0.315±0.01	0.094±0.0025	0.098±0.001
Concentration (µg/ml)	Percentage scavenging activity		
	Hexane	Ethyl acetate	Methanol
5	1.523	21.574	33.501
20	2.283	47.207	41.117
40	4.06	51.014	43.739
60	4.821	61.674	48.139
80	18.02	73.604	72.335
100	20.0506	76.141	75.127
IC50	>100 (µg/ml)	40.949	45.715 (µg/ml)

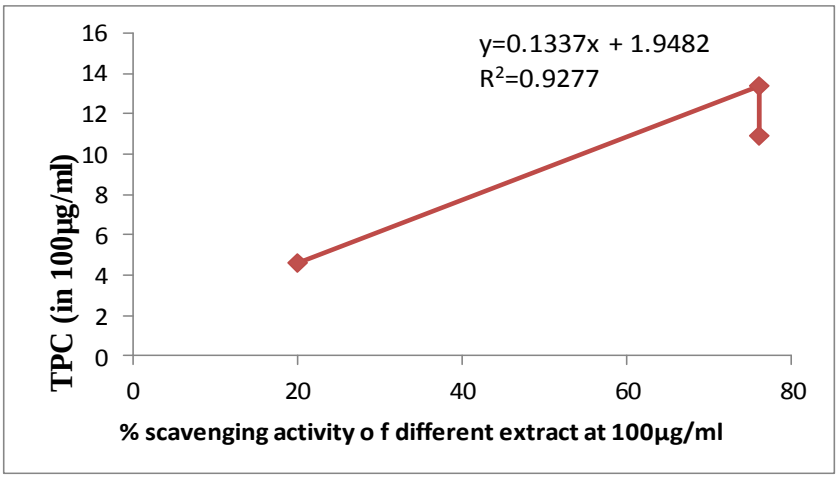


Figure 8: linear correlation between TPC and antioxidant activity of *Begonia picta.*

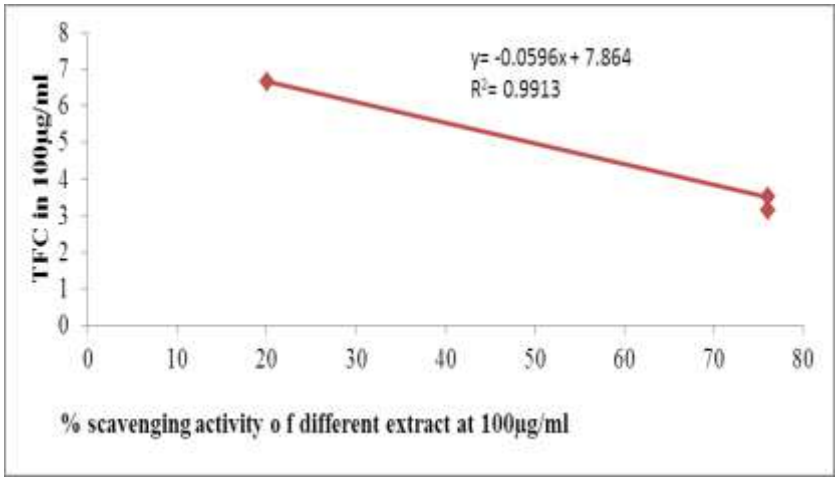


Figure 9: linear correlation between TFC and antioxidant activity of *Begonia picta.*

Table 6: Correlation of total polyphenolic content and total flavonoid content with antioxidant activity.

Correlation coefficient	Antioxidant activity
TPC	0.9277
TFC	0.9913

Correlation between TPC and TFC with antioxidant activity is significantly found. (Where $R^2 > 0.9$).

Antibacterial activity test of different extracts

The following table shows the result of preliminary antimicrobial activity of different extracts of *Begonia picta.* Hexane and methanolic extract shows no indicative antibacterial activity against the tested stamps of microorganisms. Only the ethyl acetate extract shows the indicative antimicrobial activity against and *Salmonella typhi* among the tested stamps of microorganisms.

Table 7: Result of antibacterial activity test

Microorganism	Zone of inhibition (mm)			
	Hexane extract	Ethyl acetate extract	Methanol extract	Control
Staphylococcus aureus	-	10	-	19
Bacillus cereus	-	7	8	16
Escherichia coli	-	-	-	29
Salmonella typhi	-	13	4	18

Note: Control = 50µg/ml Ofloxacin

(-) indicates the no zone of inhibition Concentration of all extracts were 100mg/ml

Determination of minimum bactericidal concentration (MBC

Plant extracts whose zone of inhibition (mm) was ≥ 12 mm in respective microorganism were subjected to MBC determination. The MBC value for methanolic extract ethyl acetate in *Salmonella typhi* was found to be 6.25mg/ml.

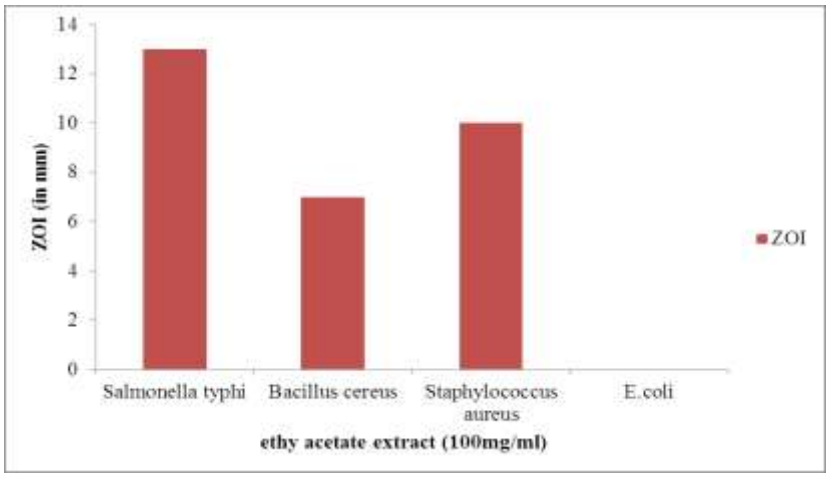


Figure 10: ZOI of ethyl acetate extract of *Begonia picta.*

DISCUSSION

The present study deals with the studies on pharmacognostic, phytochemical, antioxidant and antibacterial activity on leaves and stems of *Begonia picta.* Literatures regarding the present study were not found. The macroscopic and microscopic studies may be important for identifying, authentication and detection of adulteration of the plant. The microscopic study of leaf showed the presence of upper and lower epidermis, mesophyll and mid rib region with numerous vascular bundle. The epidermal layer of leaf shows the presence of anisocytic type of stomata. The microscopic study of stem showed the epidermis, cortex, vascular bundle arranged in ring and pith with parenchymatous cells consisting abundant starch grains. Phytochemicals present in plant act as the source for the treatment of different health

problem. Different phytochemical have different therapeutic value. The plant material *Begonia picta* was successively extracted with hexane, ethyl acetate and methanol. The phytochemical test result showed that the methanolic extract has large number of phytochemicals. Those phytochemicals present in methanolic extract were Saponin, tannin, terpenoid, carbohydrate, flavonoid, phenol, glycosides, cardiac glycoside and anthraquinone glycoside and absence of alkaloid. Previously phytochemical studies the macerated methanolic extract of *Begonia floccifera* flower showed the presence of phenol, flavonoid, saponnin, triterpenoidal saponogenin and carbohydrate and absence of alkaloid.[31] For the phytochemicals present in methanolic extract, the present study is similar to the previous study. It may be because of the phytochemical similarity in the genus *Begonia.* Result revealed that the TPC and TFC value were varied in different extracts and ranged from 23.1509 in hexane, 54.584g in methanol and 66.9945 in ethyl acetate mg GAE/g of extract in total phenol and from 15.8085 in methanol, 17.555 in ethyl acetate and 33.3617 in hexane mg QE/g of extract for total flavonoid. The sequence of antioxidant activity of *Begonia picta* extracts were; ethyl acetate (with IC_{50} value 40.949µg/ml) > methanol (IC_{50} value 45.7184µg/ml) > hexane (IC_{50} value 248.365µg/ml). Plants are important source potential chemotherapeutic agent. The in-vitro antibacterial activity test is the first step for the development of new chemotherapeutic agent.[32] Ethno botanical approach is one of the common methods that are employed for selecting the plants for pharmacological activity.[33] The antibacterial screening of hot extracted hexane and methanolic extracts of *Begonia picta* was found to be non-indicative to the tested stamp of microorganisms. The antibacterial screening of hot extracted ethyl acetate extract of *Begonia picta* in 100mg/ml concentration was found to have indicative antibacterial activity only in *Salmonella typhi* and non-indicative to *Staphylococcus aureus, Bacillus cereus* and *E.coli.*

CONCLUSION

Pharmacognostic and phytochemical evaluation of leaves and stems of *Begonia picta* will provide the information for its identification. Phytochemicals present in hexane, ethyl acetate and methanolic extracts of *Begonia picta* were alkaloid, tannin, saponnin, terpenoid, glycoside, carbohydrate, flavonoid, phenol, cardiac glycoside and anthraquinone glycoside. Phytochemicals which have pharmacological and therapeutic value gives the correct identity and purity of plant parts and detection of adulteration as well. Present result indicates that the methanolic extract of *Begonia picta* content larger number of phytochemicals. Ethyl acetate extract of *Begonia picta* has good antioxidant activity with highest TPC (66.994 mg GAE/g)

and second highest TFC (17.55 mg QE/g). The TPC and TFC correlation study with antioxidant activity of respective extract showed that TPC and TFC were significantly correlated. It means that extract having higher TPC and TFC value shows greater antioxidant activity. This information clearly represent that the plant *Begonia picta* is the good source of dietary antioxidant. Phytochemical analysis and antioxidant activity determination in present study revealed that the phytochemicals, including polyphenol and flavonoid may be responsible for the observed antioxidant activity. Antibacterial activities of hexane and methanol extract of *Begonia picta* against the tested stamps of microorganisms were found to be non-indicative. Only the antibacterial activity of ethyl acetate extract *Begonia picta* was found to be indicative against *Salmonella typhi.*

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