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Phytochemical Analysis Of *Pouzolzia Wightii* Benn. Leaf, Stem And Root In Different Extracts Using UV-Visible Spectroscopic Technique

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ABSTRACT

Plants are known in the pharmaceutical industry for their expansive structural range as well as their wide range of pharmacological actions. The biologically active compounds present in plants are called phytochemicals. These phytochemicals are derived from different parts of plants such as leaves, flowers, seeds, barks, roots and pulps. They are used as sources of straight medicinal agents and serve as a raw material base for elaboration of more complex semi-synthetic chemical compounds. *Pouzolzia wightii* Benn. is a medicinal herb comprising health-promoting secondary metabolites. This study was aimed to profile bioactive compounds in the different extracts using UV-Visible Spectroscopic Technique. The preliminary phytochemical screening tests revealed the presence of cardiac glycosides, flavonoids, saponins, tannins, and terpenoids. The UV-Vis profile revealed various absorption bands ranging from 299 to 800 nm with different absorption respectively indicating the presence of flavonoids, phenolic compounds, tannins, terpenoids, carotenoids, chlorophyll, and alkaloids. The present study confirmed that *Pouzolzia wightii* Benn. contain nontoxic secondary metabolites that may play a pivotal role in human health.

Key Words: Medicinal plants, Phytochemicals, Bioactive compounds, Secondary metabolites.

INTRODUCTION

Medicinal plants are abundantly available all over the world and are gaining a lot of attention due to their specific role in various health care of human immune system in different nations. Medicinal plants extracts are a wealthy natural source of bioactive phytochemicals .They also care for plants from disease and damage. In general, the plant chemicals that act as a shelter for plant cells from the environmental hazards such as pollution, stress, drought, UV exposure and pathogenic attack are recognized as phytochemicals (Mathai, 2000). They serve as therapeutic agents as well as important raw materials for the manufacture of traditional and modern medicine (Ghani, 2003). Plant based drugs are highly effective, low cost, easily available, evidently minor toxicity as side effects and proving to be a good substitute for allopathic medicines (Ashis, 2003). Phytochemicals are biologically active chemical compounds naturally present in a plant which acts as a natural defense system for plants and provide aroma, colour and flavour. They have a significant role in treating human diseases such as cancer, coronary heart diseases, diabetes and infectious diseases (Sakanaka *et al.,* 2005). The therapeutic properties of medicinal plants are due to the existence of some phytochemical compounds. Medicinal plants contains different phytoconstituents which include flavonoids, carotenoids, alkaloids, anthocyanidins, phenolics, tannins, carboxylic acids, terpenes, amino acids and inorganic acids (Argal and Pathak, 2006). Presence of these phytoconstituents provides specific distinctiveness and properties to the plants (Parekh and Chanda, 2007). Therefore, the phytochemical characterization of these constituents would help in determining various biological activities of plants. A variety of techniques can be used to determine the presence of such phytoconstituents in medicinal plants. Spectroscopic methods (UV-Vis and FT-IR) together or separate can be used in this sense as well as conventional methods (Ibrahim *et al.,* 2008). In many applications other techniques are available but UV-Visible spectrometry is specifically used for its simplicity, versatility, speed, accuracy and cost-effectiveness; it is used to determine the chemical compounds of the plants.

UV-Vis spectrophotometry related to the spectroscopy of photons in the UV-visible region. UVVisible spectroscopy uses light in the visible ranges or its adjacent ranges. The absorption in visible ranges directly affected by the colour of the chemicals so that the molecules undergo electronic transitions in visible ranges of electromagnetic spectrum (Gunasekaran, 2003). In chemotaxonomy and pharmacognosy the UV-Vis profiles are used as a biochemical and pharmacognostical marker to idendify the medicinal source. But there is no report on the spectroscopic studies of *P. wightii.* With this background the present study was aimed to reveal the spectroscopic profile (UV-Vis) of *P. wightii.*

METHODOLOGY

UV – Vis analysis

For UV-Vis spectrophotometer analysis, the crude extracts of *P. wightii* were centrifuged at 3000 rpm for 10 min and filtered through Whatmann No. 1 filter paper and the filtrate was used for spectroscopic analysis.To detect the UV-Vis spectroscopic profile of *P. wightii* crude extracts were examined under UV – Vis shimazdu spectrophotometer with the wavelength ranged from 100 to 1100 nm.

Results

UV – Vis analysis

The UV-Vis spectroscopic profile of *P. wightii* different extracts were taken from wavelength ranged from 299 to 800 nm due to sharpness of the peak values and proper baseline. The presence of an absorbance band at a particular wavelength is a good indicator for the presence of a chromophore. The absorbance revealed the concentrations of metabolites present in the expressed nanometer. These spectrum profiles are useful to identify the specific bioactive classes of compounds found in various extracts of *P. wightii*.

Pouzolzia wightii

The results of UV-Vis spectroscopic analysis of petroleum ether, chloroform, ethyl acetate, acetone and ethanolic extracts of *P. wightii* leaves, stem and roots were illustrated in Table 1. And Plate 1(a-o).

UV-Vis spectroscopic profile of ethanol, chloroform and ethyl acetate extracts of *P. wightii* leaves displayed more number of peaks (5) followed by acetone (3 peaks) and petroleum ether extracts (2 peaks). In *P. wightii* leaves, UV region showed only one peak with 0.325 absorbance at 319 nm. In visible region, ethyl acetate extracts of *P. wightii* leaves represented the maximum absorbance 4.000 at

403 nm and petroleum ether extracts of *P. wightii* leaves were illustrated minimum absorbance 0.062 at 668 nm in [Table 1; Plate 1: (a-e)].

In *P. wightii* stem, acetone and ethyl acetate extracts expressed more number of peaks (6) followed by ethanol and chloroform (4), petroleum ether (3) extracts. An acetone extracts of *P. wightii* stem showed the highest absorbance 3.457 at 339 nm and the lowest absorbance 1.931 at 305 nm in UV region. In visible region, chloroform extracts showed the maximum absorbance 2.436 at 665 nm and petroleum ether extracts illustrated minimum absorbance at 666 nm [Table 1; Plate 1: (f-j)].

Among the five different extracts of *P. wightii* root, chloroform and petroleum ether extracts expressed more number of peaks (7) followed by ethanol and ethyl acetate (6 peaks), acetone (1 peaks) extracts. An ethyl acetate extracts of *P. wightii* root exhibited highest absorbance 1.702 at 307 nm and the lowest absorbance 0.317 at 319 nm in petroleum ether extracts. In visible region, acetone extracts represented the maximum absorbance 1.011 at 661 nm and petroleum ether extracts exhibited minimum absorbance 0.118 at 533 nm [Table 1; Plate 1:(k-o)].

Table 1: UV - Vis peak values of *Pouzolzia wightii*

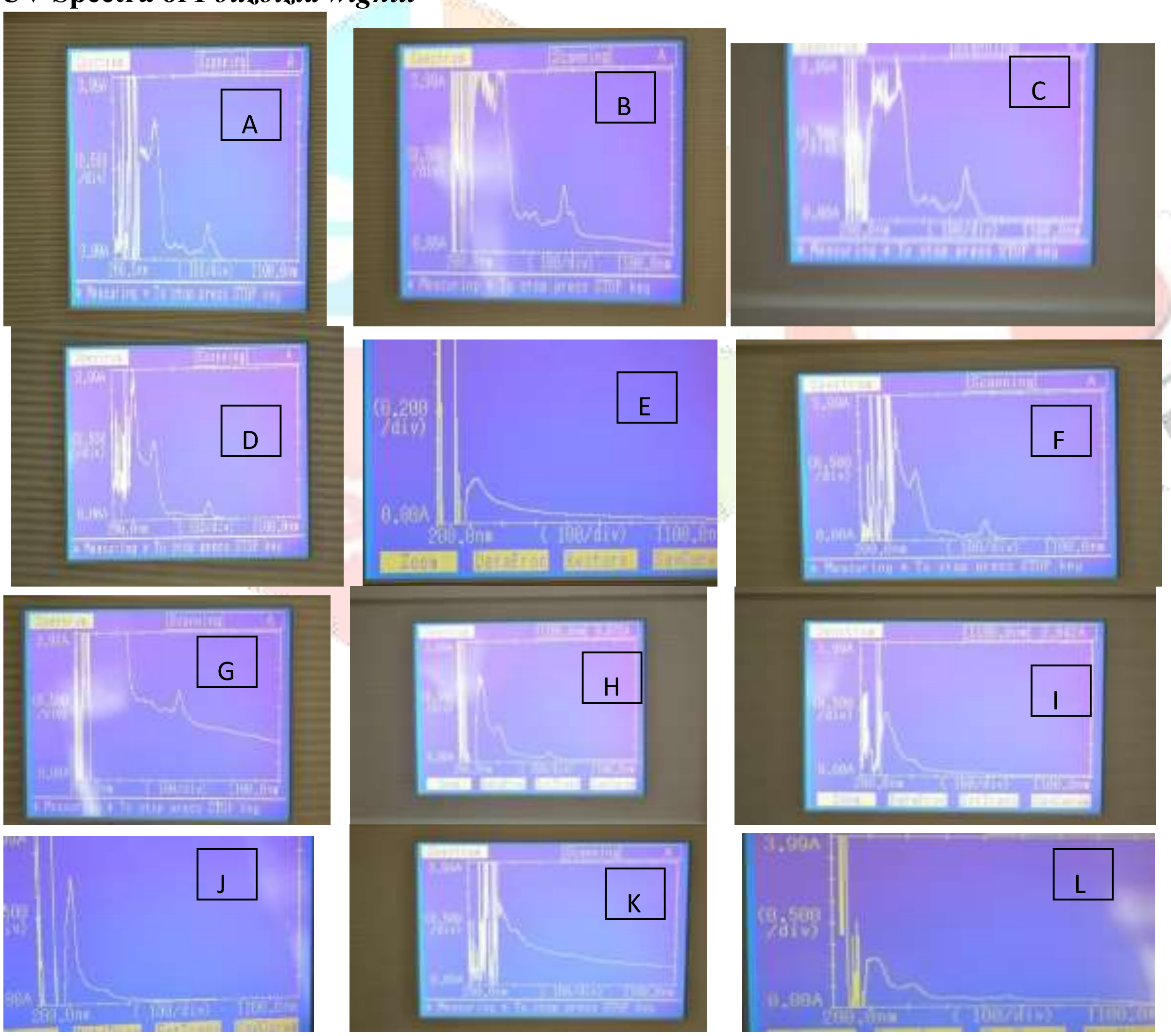
Plant Extracts	Leaves		Stems		Roots	
	λ max	ABS	λ max	ABS	λ max	ABS
Petroleum ether	668	0.062	751	0.03	791	0.082
	319	0.325	666	0.063	667	0.145
			310	2.962	607	0.111
					533	0.118
					505	0.124
					409	0.263
					319	0.317
Ethanol	666	0.462	665	0.15	664	0.237
	608	0.122	497	0.182	606	0.169
	531	0.178	402	0.512	538	0.189
	502	0.219	305	1.931	504	0.202
	402	2.128			407	0.547
					307	1.557
Ethyl acetate	664	1.311	664	0.381	665	0.236
	606	0.399	604	0.201	605	0.128
	540	0.559	534	0.268	536	0.153
	504	0.614	502	0.308	504	0.167
	403	4	409	1.216	409	0.671
			307	2.991	307	1.702
Chloroform	697	0.889	953	1.26	699	0.189
	667	1.487	665	2.436	666	0.261
	609	0.719	606	1.959	608	0.208

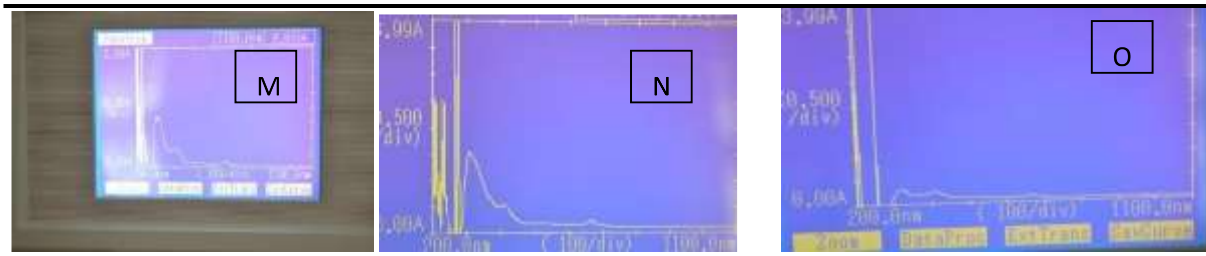
	544	0.899	540	2.157	542	0.242
	507	0.891	508	2.214	515	0.234
					413	0.559
					305	1.173
Acetone	664	0.825	663	0.533	661	1.011
	606	0.213	605	0.157		
	540	0.328	534	0.224		
			504	0.27		
			409	1.945		
			339	3.457		

Note: λ max – Wavelength of maximum absorption; ABS - Absorbance

Plate: 1

UV Spectra of *Pouzolzia wightii*





Pouzolzia wightii **– Leaves: a. Acetone, b. Chloroform, c. ethyl acetate, d. ethanol, e. Petroleum ether**

Pouzolzia wightii **– Stem: f. Acetone, g. Chloroform, h. ethyl acetate, i. ethanol, j. Petroleum ether**

Pouzolzia wightii **– Root: k. Acetone, l. Chloroform, m. ethyl acetate, n. ethanol, o. Petroleum ether.**

DISCUSSION

Spectroscopic techniques have become a powerful analytical tool for the qualitative and quantitative analysis of pharmaceutical and biological materials. UV-Vis is proved to be a reliable and sensitive method for detection of bimolecular composition (Kumar and Devi Prasad, 2011). Proper investigation of medicinal plants composition and their activity is very important to promote the therapeutic compounds (Nair and Chanda, 2006).

The UV-Visible spectra results obtained in the methanolic extracts of *Meisotropis pellita* leaves showed the absorption 0.085, 1.250, 2.605, 4.455 and 3.639 at 660, 340, 270, 235 and 210 nm (Rani *et al*., 2016). They confirmed the presence of phytochemicals flavonoids, alkaloids through qualitative analysis of the methanolic extract of *M. pellita* leaves supported by the spectroscopic studies showed the characteristic peaks obtained in the UV-Visible region. In the present study also flavonoids and alkaloids occurrence were confirmed through qualitative analysis of *P. wightii* leaves. The presence of these phytochemicals was also supported by the spectroscopic studies by showing the characteristic peaks obtained in UV -Visible region.

Sathish *et al*., (2012), Sahu and Saxena (2014) and Janakiraman and Johnson (2017) employed the UV-Vis peak values as pharmacological marker to characterize *Vitex altisima*, *Curcuma caesia* rhizome, and *Cyathia* species respectively. In the present study also, the spectroscopic peak values for *P. wightii* were identified. These spectrum profiles will be used to identify the plants. These profiles will act as pharmacological marker in the pharmaceutical industries.

UV-Vis spectrum with absorption bands at 230-290 nm, 400-550 nm and 600-700 nm indicate the occurrence of flavonoids and its derivatives, terpenoids and chlorophyll in the crude extracts (Mamta and

Jyoti, ; Neha and Jyoti). The occurrence of UV-Vis spectroscopic around 280 - 330nm indicate the existence of phenolic derivatives, at 330 nm confirms the presence of flavonoids in the crude extracts (Bunghez *et al.,* 2013). In the present study the chlorophyll occurrence was confirmed in all the studied extracts of *P. wightii*. The terpenoids existence also substantiated in the studied extracts of *P. wightii* except, ethanolic extracts of *P.wightii* stem and acetone extracts of *P. wightii* root.

The presence of phenols, alcohols, amide, alkanes, carboxylic acids, aldehydes, ketones, alkenes, primary amines, aromatics, esters, ethers, alkyl halides and aliphatic compounds were confirmed by Anand and Gokulakrishnan (2012), Bobby *et al*. (2012), Ragavendran *et al*. (2011), Renuka *et al.* (2012) and Yamuna devi *et al*. (2012) in *Hybanthus enneaspermus, Aerva lebbeue, Aerva lanata, Caralluma nilagiriana,* and *Aerva lanata* leaves, stem and roots. In the present study also similar results were observed in *P. wightii.*

In addition to the previous observation, the current study exposed and supplemented the functional groups of *P. wightii* leaves. In addition, UV-Vis spectroscopy is proved to be a reliable and sensitive method for detection of bio molecular composition.

SUMMERY AND CONCLUSION

In UV-Vis analysis *P. wightii* showed more number peaks in roots (7) of petroleum ether and chloroform extracts than other parts. Chloroform, ethyl acetate and ethanolic extracts of *P. wightii* leaves observed 5 peaks and *P. wightii* stem acetone and ethyl acetate extracts showed 6 peaks. Medicinal property of plant extracts are confirmed by the presence of functional compounds and metabolites. These UV-Vis spectroscopic results may be used as pharmacognostic marker in the pharmaceutical industries and can be used as chemometric tool to distinguish the studied *P. wightii* leaves, stem and root.

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