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PHYTOCHEMICAL EVALUATION AND ANTIOXIDANT ACTIVITY OF *PTERIS VITTATA* L FROM BHIWANDI

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Abstract

Plants contain a variety of phytochemical compounds that are rich in antioxidant activity, including, lignin, stilbenes, tannins, flavonoids, vitamins, terpenoids, phenolic acids, quinones, alkaloids, amines, betalains, and other metabolites. Numerous of these antioxidant compounds have been shown in studies to exhibit anti-inflammatory, anti-atherosclerotic, anti-tumor, anti-mutagenic, anti-carcinogenic, antibacterial, and antiviral properties. Natural phytochemicals are found in crops like teas, herbs, oilseeds, beans, vegetables and fruits. They have been linked to lower risks of cancer, cardiovascular disease, diabetes, and other age-related diseases. Recently, there has been a global trend toward the use of these phytochemicals. The objective of this research was to use qualitative and quantitative screening methods to see phytochemicals were present in the methanol extracts Pteris vittata from Bhiwandi including steroids, reducing sugars, triterpenoids, sugars, alkaloids, phenolic compounds, flavonoids, saponins, tannins, and anthraquinones, were tested. More active compounds can be isolated from the selected ferns and they may be used for medicinal purposes in future.

Keywords: *Pteridaceae, Phytochemicals, Ferns, Qualitative and quantitative screening.*

INTRODUCTION

Plants are rich source of phytochemicals such as, phenolic acid, tannins, quinones, alkaloids, betalains ligning as well as metabolites which can perform antioxidant activity. (Zheng W, Wang SY.2001, Cai Y.Z, 2003).

As per WHO report more than 75% people of developing countries prefer plant derived medicines for their health Problems. (Gurib-Fakim A 2006). In past few years, there has been a worldwide trend towards the use the demand of the natural phytochemicals derived from vegetables and fruits, berry crops, different seeds and herbs has been increased. (Kitts DD *et al* 2000, Wang SY, Jiao H 2000 ,Muselík J, García-Alonso M 2007) .

Pteridophytes belong to nearly 50 plant families which comprise upto 13000 species, but only few of species from thirty families have been explored for their biological activity. Although higher plants have been studied carefully, in terms of their medicinal, economical and commercial values, there is poor investigation of Pteridophytes in terms of these values. Hence there is very less information available on the literature regarding medicinally important except a few studies (PN Manandhar. 1996, Sharma NK 2002, A Benjamin; Manickam VS. 2007)

(Rice-Evans *et al* 1995and Sala A *et al* 2002). In their study found that Pteridophytes have various phytochemical molecules such as vitamins, terpenoids, phenolic acids, lignin's, stilbenes, tannins, flavonoids, quinones, coumarins, alkaloids, amines, betalains, and other metabolites. These compounds have antioxidant activity. These antioxidant compounds possess anti-inflammatory, antiatherosclerotic, antitumor, antimutagenic, anticarcinogenic, antibacterial, and antiviral activities natural antioxidants are linked with ageing diseases like diabetes, cancer, cardiovascular disease etc.

Hence to develop new drugs from underexplored plant groups, it is essential to encourage intensive scientific research on pteridophyte species to contribute in search for affordable medicines in India.

MATERIAL AND METHOD

Collection of plant materials

Fresh leaves (fronds) of the *Pteris vittate L* were collected randomly from the different location of Bhiwandi. Fresh leaves of *Pteris vittate L* were washed; shade dried and powdered using the blender and stored in air tight containers.

Quantitative phytochemical analysis

The phytochemicals present in the methanol extracts of *P. vittata,* were determined and quantified by standard procedures. Quantification of tannins by Hagerman et al 2000. Anti oxidant and free radical scavenging activity by Kumaran A, Karunakaran R 2006, phytochemical methods by Harborne J 1973. , Formation of complexes between protein and Tannin acid by Van-Burden T and Robinson W J. 1981

OBSERVATION:

Phytochemical compounds such as steroids, reducing sugars, triterpenoids, sugars, alkaloids, phenolic compounds, flavonoids, saponins, tannins, and anthroquinones were screened in extract. The data have been presented in Table 1and 2 and Text Fig 1-2.

P. vittata extract contained 12.30 mg of alkaloids, 13.90 mg of flavonoids, 08.80 mg of saponins and 06.10 mg of tannins, 11.20 mg of phenolic compounds. It was observed that various concentrations of leaves and stem extracts Pteris has significant antioxidant potential and can used as good source of natural antioxidant. Alkaloids,

phenolic compounds, flavonoids, saponins and tannins are important secondary metabolites and are responsible for medicinal values of the respective plant.

Antioxidant properties of ferns was determined by estimating their DPPH radical scavenging activity In DPPH assays, methanol extracts from leaves of *P.vittata* exhibited higher antioxidant activity (20 µg/ml) (37.8%) than aqueous (29.3%) or chloroform extracts (13.3%). It was observed that various concentrations of leaves and stem extracts Pteris has significant antioxidant potential and can used as good source of natural antioxidant.

Figure 1 Pteris in Bhiwandi

Compounds	**Presence**
Steroids	+
Triterpenoids	+
Reducing sugars	+
Sugars	+
Alkaloids	+
Phenolic compounds	+
Flavenoids	+

Figure 2 Phytochemical analysis of Pteris vittata

S.N	**Phytochemical**	**Amount(mg/g)**
1	Alkaloids	12.30 ±0.10
2	Flavonoids	13.90 ±0.20
3	Phenolics	11.20±0.10
4	Saponins	08.80±0.50
5	Tannins	06.10±0.20

Figure 1 Quantitative analysis of phytochemical (mg/g)

DISCUSSION

In the present study methanol extracts of *Pteris vittata* are screened for phytochemical analysis. The results revealed positive result. Kumudhavalli and Jaykar (2012) did phytochemical analysis of *Hemionitis arifolia.* The ethanolic and aqueous extracts showed the presence of flavonoids, carbohydrates, phenolic compounds and sterols were the major phyto constituents. the phyto-constituents of three *Adiantum* species *Christella dentate* and *Christella parasitica*, to provide chemical marker and inter-specific variation between the medicinally important genus were examined Muraleedharannair *et al*. (2012).

A review done by Ganesan K, Xu (2014) highlighted the phytochemical composition of Pteris cretica and its potential health benefits, including antioxidant properties. The plant was found to contain various bioactive compounds with potential therapeutic applications.

Sahu RK, Karuppusamy S, Sabu A, et al 2013. In their study found that different fractions of *Pteris vittata* extracts exhibited significant antioxidant activity. The phytochemical screening also revealed the presence of various bioactive compounds. Rajurkar and Kunda (2012) screened *Adiantum capillus - veneris* for phytochemicals and metal content. The Soxhlet extraction of *Adiantum capillus veneris* showed the considerable amount of phenolics and terpenoids, fats and waxes, alkaloids, quaternary, Noxides and fiber.

In the present study, highest amount of alkaloids (16mg), flavonoids (17mg) and phenolics (13mg) are quantified in the *Pteris vittata*. Xie P, Chen S, Li L, et al. 2011 investigated the phytochemical composition and antioxidant activities of different parts of *Pteris multifida.* Various bioactive compounds, such as phenolics and flavonoids, were identified, and the extracts exhibited significant antioxidant activities.

In the present study *Pteris* extracts showed the presence of alkaloids, flavonoids and saponins. Based on present study further research can be done using chromatographic and spectroscopic techniques in the way of isolation and identification of the active compound from Pteris. Hence by further study biologist can evaluate the medicinal uses of pteridophytes and their bioactive principles. The efficacy of bioactive compounds could be increased by studies of in vitro culture, biosynthetic pathways, modes of action, and genetic expression.

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