CHAPTER 1

Qualitative phytochemical analysis of *Pavetta indica* L. flowers: a medicinal plant of India

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Abstract: Qualitative phytochemical screening of flowers of *Pavetta indica* was carried out and results are presented here to validate its medicinal uses. Qualitative phytochemical screening showed the presence of tannin, saponin, flavonoids, terpenoids, phenolic compounds and reducing sugar which might be responsible to medicinal claims on the flowers of *P. indica*. Study recommends to do more exploration works and document the locally available medicinal plants of India.

Keywords: Locally available medicinal plants, traditional therapeutic uses, phytochemistry

Introduction

Traditional medicinal plants are basic panacea of tribal communities in India (Kumar and Jena, 2017; Dimri *et al.,* 2024). They have been used from long. Now, we are losing plant diversity, traditional practices, and precious therapeutic knowledge (Das *et al.,* 2022) on local medicinal plants (Kumar *et al.,* 2021). In this aspect, documentation of such medicinal plants is very important in contemporary situation. During the floral diversity assessment (Devi *et al.,* 2024; Lal *et al.,* 2024) and documentation of traditional knowledge of Mahanadi River areas, authors found a plant, locally known as Kukurchalia (Figure 1). Local fishing community use its flowers to treat cold and cough. After morphological observation of Kukurchalia, it was identified as *Pavetta indica* (Figure 2). It is a small tree and found a good population near Mahanadi River areas. Keeping the medicinal uses of *P. indica*, an attempt has been made to document the bioactive compounds available on flowers through phytochemical screening to validate its medicinal claims.



Figure 1: Discussion with local people on Kukurchalia



Figure 2: Flowers of *P. indica* in wild

Methodology

Collection of plant sample and preparation of extracts

The flowers of *P. indica* were collected from the roadsides of Kainya village of Cuttack district of Odisha state in June 2024 (Figure 3). The plant was identified by the senior author. The Soxhlet method of extraction was adopted using different solvents for phytochemical analysis (Devi *et al.,* 2023; Valigatla *et al.,* 2024). Detection of nine secondary metabolites was carried out using standard methods. An herbarium specimen (Figure 4) is deposited to the Herbarium unit of Biodiversity and Conservation of APRF, Cuttack, Odisha, India.

Qualitative phytochemical analysis

Test for tannin

About 1 ml of the filtrate of flower extract was taken. Added about 3-5 drops of 0.1% lead acetate solution into it. The gelatinous precipitate formation confirmed the presence of tannin (Tallur *et al.,* 2024).

Test for saponin

About 1 ml of the filtrate of flower extract was taken and mixed with 1 ml of distilled water and allowed to shake it vigorously. The persistent froth formation after shaking confirmed the presence of saponin (Chandra *et al.,* 2024).

Test for flavonoids

About 1 ml of the filtrate of flower extract was taken and added 2 ml of 2 % NaOH solution followed by H_2SO_4 into it. The colour initially turned to an intense yellow colour with the addition of NaOH solution and later become colourless with sulphuric acid. This change in colour confirmed the presence of flavonoids (Kumar *et al.,* 2013).

Test for terpenoids

About 2 ml of the filtrate of flower extract was added with 6 drops of chloroform and place it in the water bath for few minutes. Then 6 drops of concentrated H_2SO_4 were added. The appearance of reddish-brown interface confirmed the presence of terpenoids (Landge *et al.,* 2024).

Test for phenolic compounds

About 1 ml of the filtrate of flower extract was taken. Few drops of 5% Ferric chloride solution were added into the filtrate extract. The appearance of bluish black colour provides the positive result of the phenolic compounds (Mahendru *et al.,* 2024).

Test for reducing sugar

About 1 ml of the filtrate of flower extract was taken and 2 drops of Fehling's solution A followed by Fehling's solution B were added and kept it in water bath for few minutes. The presence of red orange precipitate confirmed the positive result of the test for reducing sugar (Vajha *et al.,* 2024).



Figure 3: Collection of *P. indica* flowers in the field

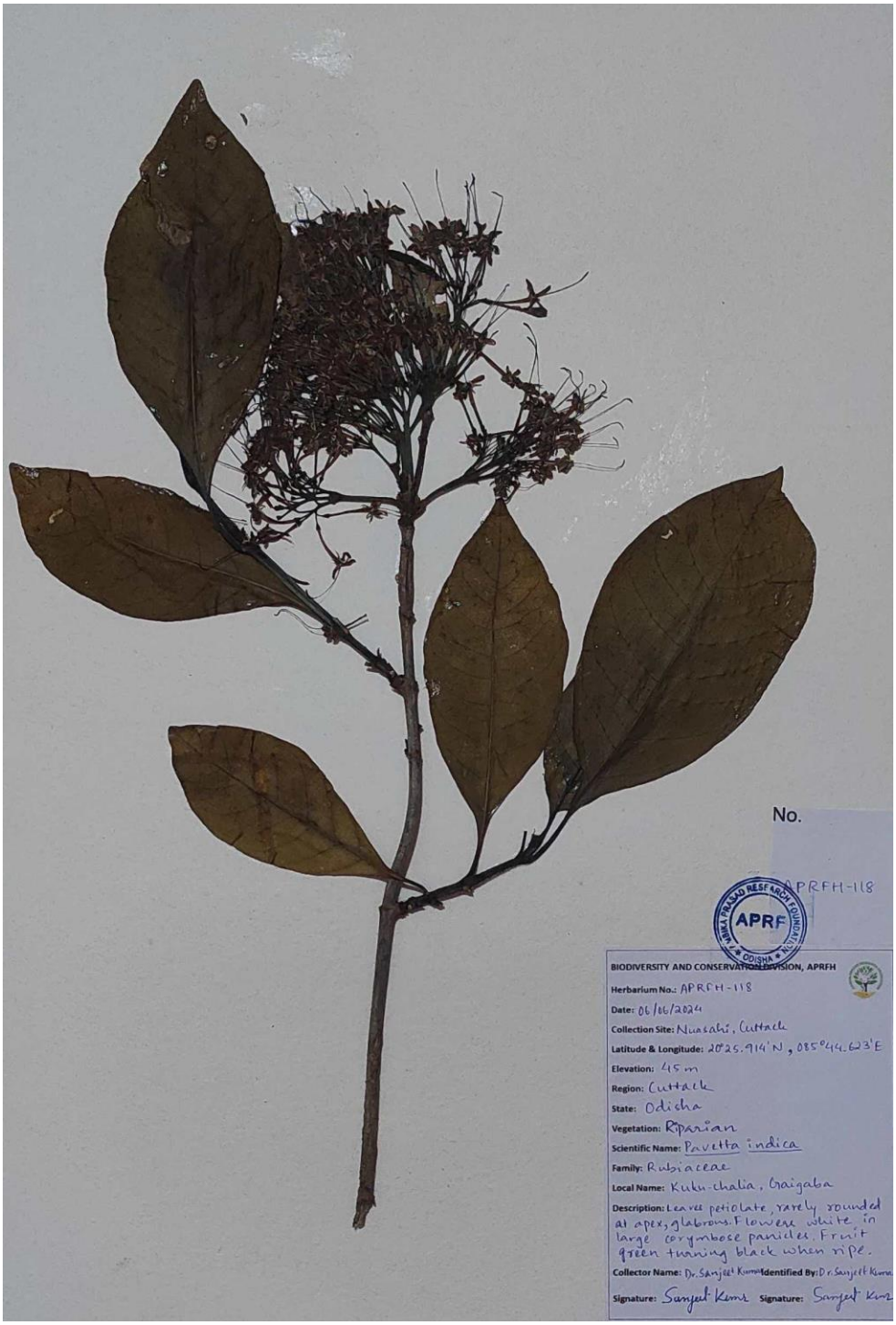


Figure 4: Herbarium specimen of *P. indica*

Test for steroids

About 1 ml of the filtrate of flower extract was taken. 1 ml of chloroform and 1 ml of concentrated sulphuric acid was added into it. The appearance of upper red and lower yellow with green fluorescence provide the positive result for the presence of steroids (Kumar and Jena, 2014).

Test for alkaloids

About 1 ml of the filtrate of flower extract was taken and added 3 to 4 drops of Dragendroff's reagent. The formation of reddish-brown precipitate confirmed the presence of alkaloids (Kumar *et al.,* 2017).

Test for carbonyl compounds

About 1 ml of the filtrate of flower extract was taken and added 3 to 4 drops of 2,4- Di-nitrophenylhydrazine reagent. The formation of yellow crystal confirmed the presence of carbonyl compounds (Mohanty *et al.,* 2021).

Results and discussion

The field survey revealed that the flowers of *P. indica* is used to treat cold and cough. The phytochemical screening was carried out and found that aqueous extract showed tannin, saponin, phenolic compounds and reducing sugar (Table 1; Figure 5). In methanol extract, it was noticed that flavonoids were also present along with all detected compounds of aqueous extract (Figure 6; Table 1) but in ethanol extract, tannin, saponin, terpenoids, phenolic compounds and reducing sugar were observed (Figure 7; Table 1). Nguyen *et al.,* (2019) documented the cytotoxic effect of metahnol extract of aerial parts of *P. indica*. Mandal *et al.,* (2023) documented the anti-inflammatory potential of *P. indica* leaf extracts. Kumar *et al.,* (2024) reported the anti-viral effects of *P. indica*. The above reports indicates that there is less or no comprehensive works are carried out in the flowers of *P. indica.*

Table 1: Phytochemical screening of secondary metabolites using different extracts of *P. indica* flower

Bioactive compounds	Aqueous	Methanol	Ethanol
Tannin	+ve	+ve	+ve
Saponin	+ve	+ve	+ve
Flavonoids	-ve	+ve	-ve
Terpenoids	-ve	-ve	+ve
Phenolic compounds	+ve	+ve	+ve
Reducing sugar	+ve	+ve	+ve
Steroids	-ve	-ve	-ve
Alkaloids	-ve	-ve	-ve
Carbonyl compounds	-ve	-ve	-ve

(-ve: negative; +ve: positive)

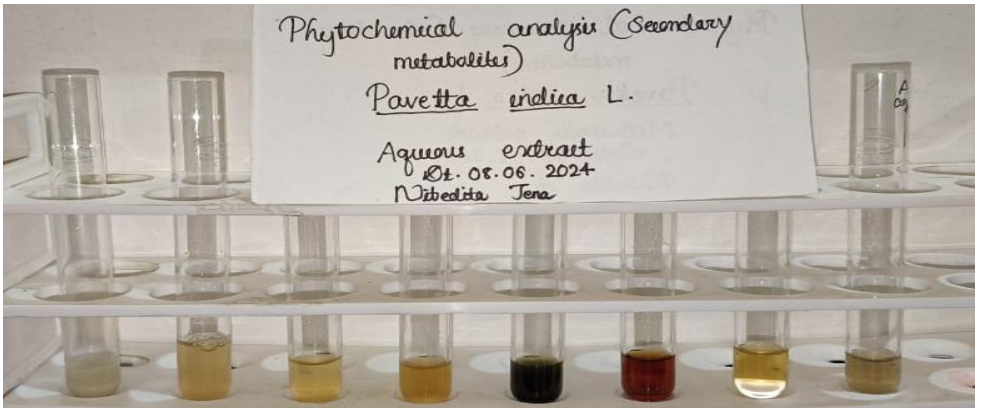


Figure 5: Detection of secondary metabolites using aqueous extract of *P. indica* flower

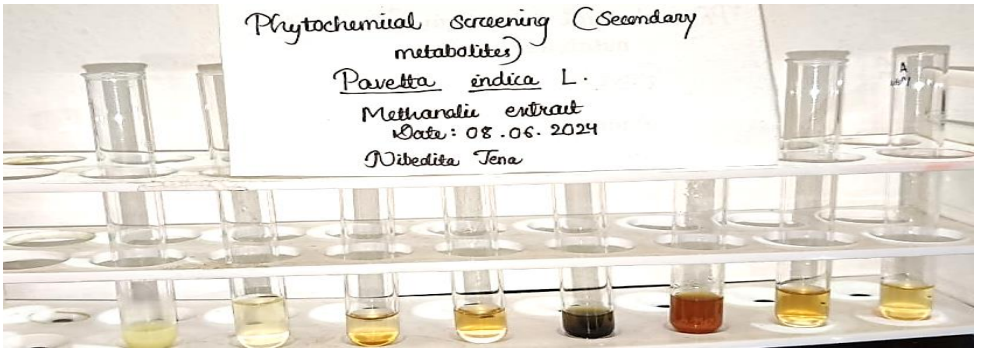


Figure 6: Detection of secondary metabolites using methanolic extract of *P. indica* flower

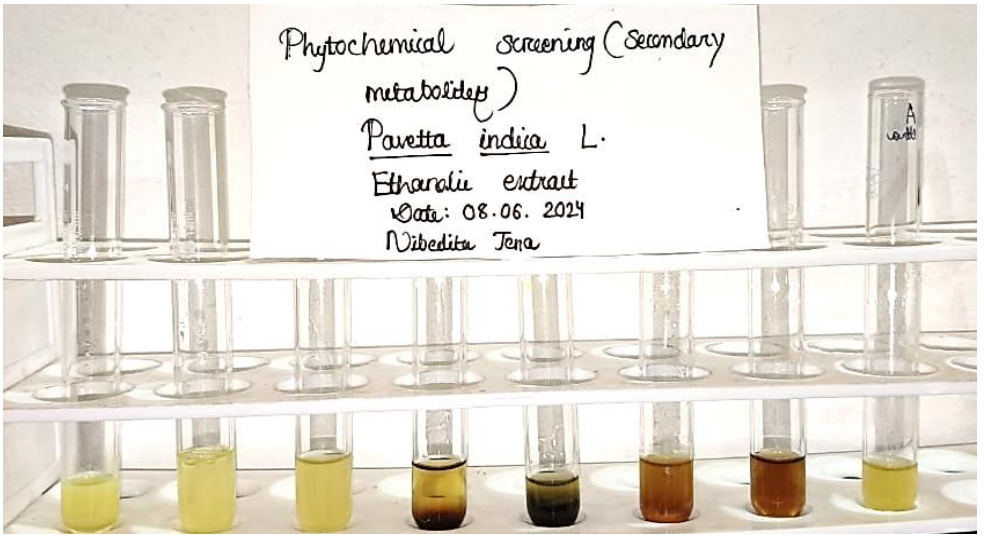


Figure 7: Detection of secondary metabolites using ethanolic extract of *P. indica* flower

Conclusion

The present study validates the medicinal claims of P. indica through phytochemical screening. The detected compounds might be responsible for curing many health problems. Therefore, there is a need to do more experimental work in ethno-pharmacological aspects.

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