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ORIGINAL ARTICLE

Qualitative Phytochemical Screening of Ethnomedicinal Plants Used by Paraja Tribe of Koraput, India

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The present study reports the qualitative phytochemical screening of selected ethnomedicinal plants used by Paraja tribe of Koraput which are known to exhibit medicinal properties reported earlier in our laboratory. The plants were subjected for phytochemical screening to determine the presence of secondary metabolites, which showed therapeutic effects as claimed by the tribal people. Qualitative analysis of alkaloids, flavonoids, tannins, saponins, stereoid, terpenoid, glycosides, anthraquinons and phenol tests were carried out for these selected plants by using different extraction (methanol, acetone and water extraction). The phenol, flavonoid, alkaloid, saponin, tannin, and steroids are major pharmaceutical parameters that are responsible for ethnomedicinal values were present in varying proportions. Based on the results, these plant species also contain significant amounts of phytoconstituents that can be exploited as a potential source for herbal remedy for various diseases. Further studies are necessary to find its different bioactivity which can give fruitful results in phytopharmaceuticals.

Key words: Ethno-medicine, phytochemicals, Paraja tribe

Ethnomedicine shows a very important function in health issues of indigenous communities addressing healing practices (Pieroni *et al*., 2005). In India about 3,000 plants are used in ethno-medicine or folk medicine based on oral information from generation to generation by different tribal communities (Das *et al*., 2003). As per the World Health Organization (WHO), nearly 65% of the world's population have used most important modality of health care practice (Farnsworth *et al*., 1985). Ethnomedicinal plants are the vital bio-resource of traditional system of medicine, modern remedy, food supplements, folk medicines, pharmaceutical intermediates and compound entities for artificial drugs (Ncube *et al*., 2008). The ethno-medicinal plants as source of remedies are broadly used as substitute healing tools for the anticipation and treatment of numerous diseases because of the presence of different phyto-constituents (Wadood *et al*., 2013). The therapeutic value of a plant is due to the presence of various biologically active compounds such as carbohydrates, proteins, enzymes, fats and oils, minerals, vitamins, alkaloids, quinones, terpenoids, flavonoids, carotenoids, sterols, simple phenolic glycosides, tannins, saponins, polyphenols etc. (Adhikari *et al*., 2012). Traditional medicine is used to maintain healthiness and to care for physical and mental illnesses in a different way from allopathic medicine based on theories, beliefs and experiences (WHO, 2002). On the other hand, traditional medicine has been used for thousands of years with vast contributions given by practitioners to human health, mostly as primary health care to the group of people and also maintained its recognition worldwide (WHO, 2002).

Paraja Tribe of Koraput is one of the leading tribal groups of India and it has developed rich biodiversity knowledge of its own. There are several scientific reports highlighted the ethno-medicinal knowledge of Paraja tribes of Koraput (Das and Mishra, 1987; Mishra and Chaudhury, 2012; Raut *et al*., 2012). However, phytochemical screening of ethno-medicinal plants used by tribal people of Koraput is not yet been studied. Due to the importance in the above perspective, such preliminary phytochemical screening of plants is need of the hour in order to find out and develop novel therapeutic agents with better effectiveness.

MATERIALS AND METHODS

The present study was conducted by taking 30 ethnomedicinal plants used by Paraja tribe of Koraput for their primary health care. The plants were selected from our earlier report of Tikadar *et al*., (2020) on the basis of their highest use value and fidelity level. The selected plants were collected from different forest patches of Koraput and the samples were oven dried at 40ºC and powdered mechanically and used for phytochemical analysis.

Phytochemical screening

For qualitative phytochemical screening, the samples were subjected to qualitative tests in three different extracts such as water, acetone and methanol extract. For phytochemical screening 2.0 g of dry powdered plant sample were dissolved in 100 ml of different solvents such as water, acetone, and methanol; and kept for overnight, then filtered and used for the further qualitative tests following the procedure of Sofowora (1993).

For alkaloid test, 2 ml of sample extract was mixed with 0.2 ml of 2% diluted HCl and 0.2 ml of Mayer's reagent. Formation of yellowish buff/cream coloured precipitation showed the presence of alkaloids. For flavonoid test, 2 ml of sample extract was mixed with few fragments of magnesium chip and added 0.2 ml of concentrated HCl in drop wise manner. Crimson red colour indicated the presence of flavonoid. For steroid test, 2 ml of sample extract was mixed with 2 ml of chloroform and 0.5 ml of concentrated H_2SO_4 added sidewise. A red colour produces in the lower chloroform layer indicated the presence of steroids. For test of terpenoid, 2 ml of sample extract was mixed with 2 ml of chloroform and solution was evaporated to dryness. To this 2ml of concentrated H_2SO_4 was added and kept on water bath for about 2 minutes. A reddish colour indicated the presence of terpenoid. For test of tannin, sample extract of 0.1 ml was mixed with 2 ml of 2% solution of $FeCl_3$. A blue-green or black colour indicated the presence of phenol and tannin. For test of saponin, sample extract of 1 ml was mixed with 4 ml of distilled

water and shaken vigorously for about 5 minutes. Frothing which persisted on warming and stable froth more than indicated the presence of saponins. For glycosides, sample extract of 0.1 ml was mixed with 2 ml of chloroform. Then 2 ml of concentrated H_2SO_4 was added carefully and shaken gently. A reddish-brown colour indicated the presence of steroidal ring. For anthraquinone, sample extract of 2 ml was mixed with 1 ml of 10% ammonia solution and mixed well. Appearance of a pink, red or violet colour in the ammoniacal (lower) phase was taken as the presence of free anthraquinones.

RESULTS

The present study reports the chemical profiling of 30 selected medicinal plants used by paraja tribe of Koraput. These plants were selected on the basis of their highest use value and fidelity level from the earlier report of ethomedicinal plants used by the paraja tribe (Tikadar *et al*., 2020).

Methanol solvent extract

Phytochemical screening of studied medicinal plants by methanol extract showed that all the medicinal plants give positive response to steroid, terpenoid and glycoside test (Table 1). All most all of the plants showed positive response to tannin test except plants like *Achyranthes aspera* L., *Tephrosia purpurea* (L.) Pers and *Thunbergia fragrans* Roxb. For flavonoid all most all the plants showed positive response except *Ageratum conyzoides* L., *Barleria prionitis* L., *Boerhavia diffusa* L., *Flemingia strobilifera* (L.) W. T. Aiton, *Physalis minima* L., *Sesbania grandiflora* (L.) Poiret. Alkaloid was present in majority of plants except *Ageratum conyzoides* L., *Barleria prionitis* L., *Boerhavia diffusa* L. and *Sesbania grandiflora* (L.) Poiret. For saponin plants like *Careya arborea* Roxb., *Premna coriacea* C.B. Clarke., *Sesbania grandiflora* (L.) Poiret, *Streblus taxoides* (Heyne ex Roth) Kurz give very good result. In case of anthraquinone test majority of the plants give negative result except some plants like *Careya arborea* Roxb., *Crossandra infundibuliformis* (L.) Nees, *Helicteres isora* Linn., *Kaempferia galangal* Linn., *Premna coriacea* C.B. Clarke., showed presence of anthraquinone.

Acetone solvent extract

In acetone solvent extract the result for phytochemical screening of selected medicinal plants showed that all most all the medicinal plants give positive response to steroid and glycoside test (Table 2). Many plants showed positive response to tannin test except *Argyreia nervosa* (Burm. f.) Bojer. In case of phenol test majority of plants showed positive response except few plants like *Achyranthes aspera* L., *Argyreia nervosa* (Burm. f.) Bojer., *Careya arborea* Roxb. and *Tephrosia purpurea* (L.) Pers. For flavonoid majority of plants showed negative response except plants like *Cuscuta reflexa* L., *Kaempferia galangal* Linn. and *Premna corionoidacea* C.B. Clarke give good response. For alkaloid test all most all the plants showed positive response except few plants like *Argyreia nervosa* (Burm. f.) Bojer, *Pongamia glabra* Vent. and *Sesbania grandiflora* (L.) Poiret. In case of saponin test majority of the plant showed negative response except some plants like *Ageratum conyzoides* L., *Cardiosperum halicacaubum* L. and *Emilia sonchifolia* (L.) DC. Ex Wight. For anthraquinone test majority of plants showed negative response except few plants like *Careya arborea* Roxb., *Crossandra infundibuliformis* (L.) Nees. and *Premna coriacea* C.B. Clarke.

Water solvent extract

Phytochemical screening in water extract showed better result than methanol and acetone solvent extract (Table 3). In water solvent extract most of the plants showed positive response to tannin, steroid, terpenoid and glycoside test. For alkaloid test majority of plants showed positive response except few plants like *Boerhavia diffusa* L., *Kaempferia galangal* Linn., *Premna coriacea* C.B. Clarke., and *Tephrosia purpurea* (L.) Pers.

DISCUSSION

The preliminary phytochemical screening of 30 selected medicinal plant extracts revealed the presence of phytochemical constituents which are known to exhibit medicinal as well as physiological activities (Tikadar *et al.*, 2020). Present study showed that alkaloids and flavonoids are found in 26 medicinal plants out of 30 selected plants. Alkaloids and flavonoids are

antibiotic principles of plants and plays defensive role against different pathogens (Hafiza, 2000).

Table 1: Phytochemical screening of selected medicinal plants by using methanol solvent medium.

Plant name	Alkaloid	Flavonoid	Tannins	Saponins	Steroid	Terpenoid	Phenol	Glycosides	Anthraquinones
Achyranthes aspera L.	++	+	-	-	++	++	-	++	-
Ageratum conyzoides L.	-	-	++	-	++	++	++	+	-
Argyreia nervosa (Burm. f.) Bojer	+	+	+	+	++	++	-	++	-
Barleria prionitis L.	-	-	+	-	+	+	+	+	-
Boerhavia diffusa L.	-	-	+	+	+	+	+	+	-
Cardiosperum halicacaubum L.	+	++	++	+	+	+	++	+	-
Careya arborea Roxb.	++	++	+	++	++	+	++	++	++
Crossandra infundibuliformis (L.) Nees	+	+	++	+	++	++	+	++	++
Cuscuta reflexa L.	++	++	++	-	+	+	++	+	+
Emilia sonchifolia (L.) DC. Ex Wight	++	+	++	-	+	++	++	+	-
Enhydra fluctuans Lour.	++	+	++	+	+	+	++	+	+
Epipremnum pinnatum (L.) Engl.	++	+	++	+	++	++	+	+	+
Flemingia strobilifera (L.) W. T. Aiton	++	-	++	-	+	+	-	++	-
Helicteres isora Linn.	++	+	++	-	+	++	++	++	++
Kaempferia galangal Linn.	++	++	+	-	++	+	+	+	++
Litsea glutinosa (Lour.) C.B.Rob.	+	+	+	+	++	++	++	+	+
Mimosa pudica L.	++	++	+	+	++	+	-	++	-
Osmunda claytoniana L.	++	+	++	+	+	+	+	+	+
Pelargonium hirsutum (Burm.f.) Sol. Ex Aiton	++	+	++	+	++	+	+	+	++
Physalis minima L.	+	-	+	-	++	+	-	+	-
Pongamia glabra Vent.	+	++	+	+	++	++	-	++	-
Premna coriacea C.B. Clarke.	++	++	+	++	+	++	+	++	++
Sesbania grandiflora (L.) Poiret	-	-	++	++	+	++	++	+	+
Sida acuta Burm. f.	+	-	+	+	+	+	++	+	-
Sida rombifolia L.	+	+	++	-	++	++	+	+	+
Streblus taxoides (Heyne ex Roth) Kurz	+	+	++	++	++	++	-	++	-
Synedrella nodiflora L.	+	+	++	-	+	+	+	+	+
Tephrosia purpurea (L.) Pers.	++	++	-	-	++	++	-	++	-
Thunbergia fragrans Roxb.	++	+	-	+	+	+	-	+	-
Urena labota L.	++	+	++	-	++	+	++	++	+

Table 2: Phytochemical screening of selected medicinal plants by using acetone solvent medium.

Plant name	Alkaloid	Flavonoid	Tannins	Saponins	Steroid	Terpenoid	Phenol	Glycosides	Anthraquinones
Achyranthes aspera L.	+	-	+	-	++	-	-	++	-
Ageratum conyzoides L.	+	-	+	++	++	+	++	+	-
Argyreia nervosa (Burm. f.) Bojer	-	-	-	+	++	++	-	++	-
Barleria prionitis L.	++	-	++	-	++	++	++	++	-
Boerhavia diffusa L.	++	-	+	+	++	++	+	++	-
Cardiosperum halicacaubum L.	+	-	+	++	+	++	++	++	-
Careya arborea Roxb.	++	-	+	-	++	++	-	++	++
Crossandra infundibuliformis (L.) Nees	+	+	++	+	++	++	+	++	++
Cuscuta reflexa L.	++	++	++	-	+	+	++	+	+
Emilia sonchifolia (L.) DC. Ex Wight	+	-	+	++	+	++	+	++	+
Enhydra fluctuans Lour.	++	+	++	+	+	+	++	+	+
Epipremnum pinnatum (L.) Engl.	++	+	++	+	++	++	+	+	+
Flemingia strobilifera (L.) W. T. Aiton	++	-	++	-	++	+	-	++	-
Helicteres isora Linn.	+	-	+	-	++	+	-	++	+
Kaempferia galangal Linn	++	++	+	+	++	++	-	++	+
Litseaglutinosa (Lour.) C.B.Rob.	+	+	+	+	++	++	++	+	+
Mimosa pudica (L.)	+	-	++	-	++	++	++	++	-
Osmunda claytoniana L.	++	+	++	+	+	+	+	+	+
Pelargonium hirsutum (Burm.f.) Sol. Ex Aiton	++	+	+	+	++	+	+	+	++
Physalis minima L.	+	-	+	-	+	+	-	+	-
Pongamia glabra Vent.	-	-	+	-	++	++	-	++	-
Premna coriacea C.B. Clarke.	++	++	+	+	++	++	+	++	++
Sesbania grandiflora (L.) Poiret	-	-	++	-	++	++	++	++	-
Sida acuta Burm. f.	+	-	+	+	+	++	++	++	-
Sida rombifolia L.	+	+	+	-	++	++	+	+	+
Streblus taxoides (Heyne ex Roth) Kurz	+	-	+	-	++	++	+	++	-
Synedrella nodiflora L.	+	+	++	-	+	+	+	+	+
Tephrosia purpurea (L.) Pers.	+	-	++	-	++	-	-	++	-
Thunbergia fragrans Roxb.	++	+	++	+	+	+	-	+	-
Urena labota L.	++	+	++	-	++	+	++	++	+

Table 3: Phytochemical screening of selected medicinal plants by using water solvent medium.

Plant name	Alkaloid	Flavonoid	Tannins	Saponins	Steroid	Terpenoid	Phenol	Glycosides	Anthraquinones
Achyranthes aspera L.	++	-	+	-	++	+	+	+	-
Ageratum conyzoides L.	++	+	++	+	++	++	++	++	-
Argyreia nervosa (Burm. f.) Bojer	+	-	+	-	+	+	+	+	+
Barleria prionitis L.	++	++	++	-	++	++	++	+	++
Boerhavia diffusa L.	-	++	++	++	++	+	++	+	++
Cardiosperum halicacaubum L.	++	-	++	-	+	+	++	+	-
Careya arborea Roxb.	++	++	++	+	++	++	++	+	++
Crossandra infundibuliformis (L.) Nees	+	+	++	+	++	++	+	++	++
Cuscuta reflexa L.	++	++	++	-	+	+	++	+	+
Emilia sonchifolia (L.) DC. Ex Wight	++	+	++	+	++	+	++	++	+
Enhydra fluctuans Lour.	++	+	++	+	+	+	++	+	+
Epipremnum pinnatum (L.) Engl.	++	+	++	+	++	++	+	+	+
Flemingia strobilifera (L.) W. T. Aiton	+	-	+	-	++	+	+	+	+
Helicteres isora Linn.	+	+	++	-	++	+	++	++	++
Kaempferia galangal Linn.	-	-	+	-	++	++	-	++	+
Litsea glutinosa (Lour.) C.B. Rob.	+	+	+	+	++	++	++	+	+
Mimosa pudica L.	++	++	++	+	++	++	++	++	+
Osmunda claytoniana L.	++	+	++	+	+	+	+	+	+
Pelargonium hirsutum (Burm.f.) Sol. Ex Aiton	++	+	+	+	++	+	+	+	++
Physalis minima L.	++	-	++	-	+	+	++	++	-
Pongamia glabra Vent.	+	-	+	-	+	++	++	++	-
Premna coriacea C.B. Clarke.	-	-	++	+	++	++	+	+	++
Sesbania grandiflora (L.) Poiret	+	+	++	++	++	++	++	++	-
Sida acuta Burm. f.	+	+	++	-	+	+	++	++	-
Sida rombifolia L.	+	+	+	-	++	++	+	+	+
Streblus taxoides (Heyne ex Roth) Kurz	++	+	++	+	++	++	++	++	++
Synedrella nodiflora L.	+	+	++	-	+	+	+	+	+
Tephrosia purpurea (L.) Pers.	-	-	+	-	+	+	+	+	++
Thunbergia fragrans Roxb.	++	+	++	+	+	+	-	+	-
Urena labota L.	++	+	++	-	++	+	++	++	+

Plants having alkaloids are used in medicines for reducing headache and fever. The biological functions of flavonoids apart from its antioxidant properties include protection against allergies, inflammation, free radicals, platelet aggregation, microbes, ulcers, hepatoxins, viruses and tumours (Barakat *et al*., 1993). Tannin is

found in 27 medicinal plants out of 30 selected plants. Tannins have been used for immediate relief of sore throats, diarrhoea, dysentery, haemorrhaging, fatigue, skin ulcers (Sakshi and Srishti, 2015)**.** Saponin is found in 17 medicinal plants out of 30 selected plants. Saponins which are used to stop bleeding and treating wounds and ulcers as it helps in red blood cell coagulation (Okwu and Josiah, 2006). Steroid, terpenoid and glycoside are found in all the 30 selected medicinal plants. Terpenoids group show significant pharmacological activities, such as anti-viral, anti-bacterial, anti-malarial, anti-inflammatory, inhibition of cholesterol synthesis and anti-cancer activities (Mahato and Sen, 1997). Phenol was found in 21 medicinal plants out of 30 selected plants. The phenolic compounds are one of the largest and most ubiquitous groups of plant metabolites (Singh *et al.*, 2007). They possess biological properties such as antiapoptotic, antiaging, anticarcinogen, antiinflammation, antiatherosclerosis, cardiovascular protection and improvement of endothelial function, as well as inhibition of angiogenesis and cell proliferation activities (Han *et al.*, 2007). Based on the results all the selected medicinal plants are very important because of their chemical constituents and could be responsible for the various pharmacological properties. Further studies are necessary to find its different bioactivity which can give fruitful results in phytopharmaceutical.

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CONFLICTS OF INTEREST

All authors have declared that they do not have any conflict of interest for publishing this research.

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