INTERNATIONAL RESEARCH JOURNAL OF PHARMACY

www.irjponline.com

ISSN 2230 – 8407

Research Article

PHYTOCHEMICAL SCREENING OF SOME ETHNOMEDICINAL PLANTS OF KANDHAMAL DISTRICT OF ODISHA, INDIA

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Article Received on: 24/12/18 Approved for publication: 12/01/19

DOI: 10.7897/2230-8407.1001321

ABSTRACT

The aim of the present study to document the ethnomedicinal uses and investigate the phytochemical screening of 20 traditionally used medicinal plants belonging to 19 families of Kandhamal district of Odisha, India. Screening of the plants was performed using standard procedures and resulted in the detection of the presence of tannins, alkaloids, terpenoids, glycosides, protein, phenol, Saponin, coumarin, leucoanthocyanin, anthocyanin, and steroids. Alkaloids were present in all plants while tannin and phenol were present in 18 of 20 plants. The presence of these phytochemicals can be correlated with the medicinal potential of these plants. Further, studies are essential to estimate their pharmacological potentials, isolate, characterize and illuminate the structures of the bioactive compounds liable for their activities and other medicinal principles.

Keywords: Ethnomedicine, phytochemical screening, Kandhamal district, Odisha.

INTRODUCTION

Medicinal plants are used by 80% of the world population as the only available medicines especially in developing countries[1]. The history of plants being used for the medicinal purpose is probably as old as the history of mankind[2]. Medicinal plants represent the most important resource of new pharmaceuticals and healthcare products[3]. The exploit of medicinal plants in the manufacturing societies has been traced to the extraction and development of several drugs from these plants as well as from traditionally used folk medicine[4]. The use of traditional medicine is common in India because that herbal drugs are cheaper and safer as compared to synthetic drugs and may be used without or minimum side effects[5]. Plants used for traditional medicine contain a wide range of substances that can be used to treat chronic as well as transmittable diseases. Clinical microbiologists have a great interest in the screening of medicinal plants for new therapeutics[6]. The active principles of many drugs found in plants are secondary metabolites[7]. Phytochemical screening of medicinal plants has revealed the presence of various bioactive phytocompounds. Therefore, the aim of the present study to carried out the qualitative phytochemical screening of 20 medicinal plants of Kandhamal district of Odisha, India.

MATERIALS AND METHODS

Study area and people

The Kandhamal district is one of the centrally located districts of Odisha which lies between 190.34'N and 200.54' N latitude, and between 830.30'E and 840.48'E longitude. It is bounded by Suvarnapur and Dhenkanal districts in the North, Ganjam and Rayagada districts in the East, Ganjam and Nayagarh districts in the South, Rayagada, Kalahandi and Suvarnapur district in the West and is having a geographical area of 11093 sq. km, out of which, an area of 7336 sq. km is covered by forest. Kandhamal has people of a total 72 different ethnic groups with several socio-economic categories of both scheduled caste and scheduled tribes living together. The commonly scheduled castes were chamar, Domb, Ganda, and Dhoba, and the scheduled tribes were bhunja, Kandha, Sabar, Bhottada, and Dal. They have upland agriculture of rice, corn and the finger-millet. These people earn through selling non-timber forest products, honey, beeswax, and a few more.

Data collection

During several visits to villages, interviews were taken and information recorded by headmen, traditional healers, old ladies and priests randomly irrespective of sex and caste or tribe. The selection of plants from Kandhamal was based on interviews in hamlets with both scheduled caste and scheduled tribes. All the information on medicinal plants recorded by them was collected taking the help of traditional healers and local people.

Sample collection and Extract preparation

Plants were collected in the month of December to January 2017 from Kandhamal district of Odisha, India. The plants were identified with flora books of the state[8, 9] and deposited in the Herbarium house; Department of Botany, Berhampur University, Odisha, India. Selected plant parts were removed from the plants and then washed under running tap water to remove dust. The plant samples were then oven dried at 60^0C for few days and was crushed into powders in a mechanic grinder. The powdered materials were then extracted using solvent methanol (300 ml) through the Soxhlet apparatus. After extracting all coloring materials, the filtrate was concentrated by evaporating in a water bath under normal pressure.

The dried extracts were weighed to determine the percent of yield using the formula[10].

$$\text{Extract yield } \% = W_2 - W_1/W_0 \times 100$$

Where, W_2= the weight of the extract and the container, W_1= the weight of the container alone and W_0= the weight of the initial dried sample.
The dried extracts were stored at 4^0C for further investigation of potential *in vitro* free radical scavenging activity.

Phytochemical screening

Qualitative analysis of methanolic extract was carried out to determine the presence of various bioactive compounds using the standard qualitative procedures[11-13].

Test for Alkaloids
To 1 mL of extract added 1 mL of Mayer's reagent and few drop of Iodine solution. Formation of yellow colour precipitate indicates the presence of Alkaloids.

Test for Terpenoids
To 1 mL of crude extract add 1 mL of concentrated H_2SO_4 and heated for 2 minutes. A greyish colour indicates the presence of terpenoids.

Test for Phenol and Tannins
To 1 mL of crude extract added 2% of 1 mL $FeCl_3$. A blue green or black colour indicates presence of phenol and tannins.

Test for reducing Sugar
To 1 mL of extract added 1 mL of Fehling's A solution and 1 mL of Fehling's B solution. Formation of red colour indicates the presence of sugar.

Test for Saponins
To 1 mL of extract added 2 mL of distilled water, shaken well and formation of 1 cm layer of foam indicates presence of saponins.

Test for Protein
To 1 mL of extract added few drop of HNO_3. Formation of yellow colour indicates the presence of protein.

Test for Steroids
1 mL of extract mixed with 1 mL of chloroform and concentrated H_2SO_4 sidewise. A red colour presence at the lower chloroform layer indicates presence of steroids.

Test for Anthocyanin
2 mL of extract is added to 2 mL of 2N HCl and NH_3, the appearance of pink red turns blue violet indicates presence of Anthocyanin.

Test for Coumarin
3 mL of 10% NaOH was added to 2 mL of extract formation of yellow colour indicates presence of coumarin.

Test for Leucoanthocyanin
5 mL of isoamyl alcohol added to 5 mL of aqueous extract, upper layer appear red in colour indicates the presence of leucoanthocyanin.

Test for Glycosides
1 mL plant extract treated with 2 mL glacial acetic acid containing a drop (2-3) of $FeCl_3$. A brown colour ring indicates the presence of positive test.

RESULTS AND DISCUSSION

The present study has revealed the ethnomedicinal importance of twenty plant species used for the different ailments by the natives. These species belong to 20 genera and 19 families. Out of these, fifteen species are growing wild whereas other five species i.e. *C. roseus*, *C. ternatea*, *M. paradisiaca*, *O. sanctum* and *P. nigrum* are growing in a garden. Leaves were widely used plant parts followed by root, flower, and stem. Plants for medicines were used either individually or in combination with other parts of other plants. Also, some plant parts were found to be used in different forms by local people for the treatment of different diseases (**Table 1**).

The extracts yield percentage is obtained by extracting of plant materials by using methanol are shown in Fig 1. The highest percentage of yield was obtained from *C. ternatea* (38% w/w) followed by *O. sanctum* (37.05% w/w) and the lowest percentage of yield was obtained from *A. tetracantha* (23.4% w/w).

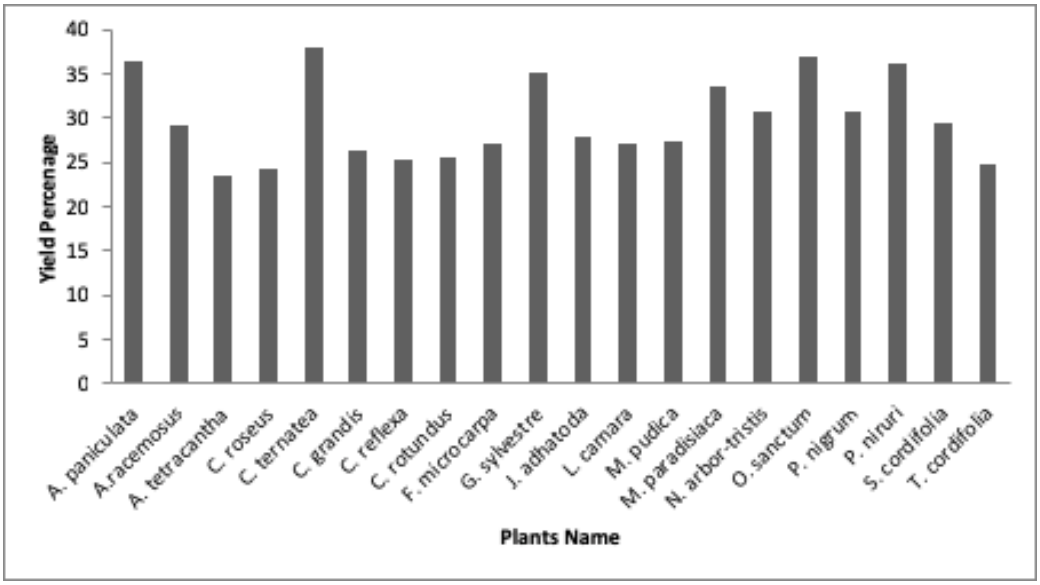

Fig 1: Yield Percentage of methanolic extract of medicinal plants.

Table 1: Ethnomedicinal plants, their preparation and traditional uses

Species/Family	Vernacular name	Plant part	Preparation	Application	Uses
Andrographis paniculata (Burm.f.) Wall. ex Nees (Aranthaceae)	Bhuinimbo	Leaf	Decoction	Oral	Diabetes, malaria
Asparagus racemosus Willd. (Asparagaceae)	Satavari	Root	Paste	Oral	Rheumatoid arthritis
Azima tetracantha Lam. (Salvadoraceae)	Kundali	Leaf	Paste	Oral	Rheumatoid arthritis, Fever
Catharanthus roseus (L.) G.Don (Apocynaceae)	Sada vihari	Leaf	Decoction	Oral	Cough and cold
Clitoria ternatea L. (Fabaceae)	Aparajita	Flower	Paste	Oral	Rheumatoid arthritis, Filaria, Flatula
Coccinia grandis (L.) Voigt (Cucurbitaceae)	Kunduri	Root	Decoction	Oral	Malaria
Cuscuta reflexa Roxb. (Convovulaceae)	Nirmuli	Stem	Decoction	Oral	Diabetes
Cyperus rotundus L. (Poaceae)	Mutha	Root	Decoction	Oral	Diarrhoea, dysentery
Ficus microcarpa L. f. (Moraceae)	Jada	Leaf	Paste, Massage	Oral	Itching, Overnight fall, To increase sperm motility
Gymnema sylvestre R. Br. (Apocynaceae)	Gudomari	Leaf	Decoction	Oral	Diabetes
Justicia adhatoda L. (Acanthaceae)	Basanga	Leaf	Decoction	Oral	Eye infection, Swelling
Lantana camara L. (Verbenaceae)	Kanta malati	Leaf	Decoction	Oral	Fever
Mimosa pudica L. (Mimosaceae)	Lajakulilata	Root	Paste	Oral	Tooth ache, Eczema, Piles
Musa paradisiaca L. (Musaceae)	Kadali	Flower	Decoction	Oral	Diabetes
Nyctanthes arbor-tristis L. (Oleaceae)	Gango siuli	Leaf	Paste	Oral	Tooth ache, Wound healing
Ocimum sanctum L. (Lamiaceae)	Tulsi	Leaf	Decoction	Oral	Cough and cold, fever
Piper nigrum L. (Piperaceae)	Golomaricho	Seed	Paste, massage	Oral	Joint pain
Phyllanthus niruri L. (Phyllanthaceae)	Badi anla	Root	Paste	Oral	Leucorrhoea
Sida cordifolia L. (Malvaceae)	Sunari	Root	Decoction	Oral	Malaria
Tinospora cordifolia (Thunb.) Miers (Menispermaceae)	Guluchi	Leaf	Decoction	Oral	Fever, diabetes

Table 2: Phytochemical screening of Ethnomedicinal plants of methanolic extracts

Plants name	Steroid	Tannin	Saponin	Anthocyanin	Coumarin	Alkaloids	Proteins	Glycosides	Terpenoids	Leucoanthocyanin	Phenol
A. paniculata	+	+	+	-	+	+	+	+	+	+	+
A.racemosus	-	+	+	-	+	+	+	+	+	+	+
A. tetracantha	-	-	-	-	-	+	+	-	+	-	-
C. roseus	+	+	+	-	+	+	-	+	+	-	+
C. ternatea	-	+	+	-	+	+	-	+	+	-	+
C. grandis	-	-	-	-	-	+	+	+	+	-	-
C. reflexa	+	+	+	-	-	+	+	-	+	-	+
C. rotundus	-	+	+	-	+	+	+	+	+	+	+
F. microcarpa	+	+	+	-	-	+	+	+	+	-	+
G. sylvestre	+	+	-	+	+	+	+	+	+	+	+
J. adhatoda	+	+	+	-	-	+	-	+	+	-	+
L. camara	-	+	+	-	+	+	+	-	+	+	+
M. pudica	+	+	+	-	+	+	+	-	+	-	+
M. paradisiaca	+	+	-	-	+	+	+	-	+	-	+
N. arbo-tristis	+	+	+	-	+	+	+	+	+	+	+
O. sanctum	+	+	+	-	+	+	-	+	+	+	+
P. nigrum	+	+	+	-	+	+	+	-	+	-	+
P. niruri	-	+	+	-	-	+	+	-	+	+	+
S. cordifolia	+	+	-	-	-	+	+	-	+	-	+
T. cordifolia	-	+	+	-	+	+	+	+	+	-	+

+ = Present; - = Absent.

The results of the preliminary phytochemical screening of these plants are reported in **Table 2**. The phytochemical tests may be helpful in the detection of the bioactive compounds and afterwards may lead to the drug discovery and development[14]. Alkaloids and terpenoids were present in all the plants. Tannins and phenols were absent in *A. tetracantha* and *C. grandis*. Only *G. sylvestre* showed the presence of anthocyanin.

Medicinal plants are the richest bioresources of drugs of traditional systems of medicine, modern medicines, folk medicines and chemical entities for the synthetic drugs[15]. The presence of phenolic compounds in the plants indicates that these plants may be an antimicrobial agent[16]. Alkaloids play some metabolic role and control the development of a living system[17]. Tannins are known to be inhibiting pathogenic fungi[17]. Apart from alkaloids and tannins, other secondary metabolite compounds such as steroid, saponin, protein, and glycosides also detected in few plant species. Saponin has the property of precipitating and coagulating red blood cells[18, 19]. Therefore, the data obtained from the experiments have provided the chemical basis for the wide use of this plant as a therapeutic agent for treating different ailments. However, there is a need to further carry out advanced hyperated spectroscopic studies in order to elucidate the structure of these compounds. Furthermore, this data may be handy in probing of the biochemistry of this plant in the future.

CONCLUSION

Screening of twenty selected medicinal plants clearly reveals that the maximum classes of phytochemicals are present in *A. paniculata* and *G. sylvestre* extracts as compared to other eighteen selected plant extracts. Hence, the above plant extract could be explored for its highest therapeutic efficacy by pharmaceutical companies in order to develop safe drugs for different ailments. The other eighteen studied plants are of equal importance due to the presence of most of the tested major phytochemicals. Since these plants have been used in the treatment of different ailments; the medicinal roles of these plants could be related to such identified bioactive compounds. The quantitative analysis of these phytocompounds will be an interesting area for future study.

ACKNOWLEDGEMENT

The first author Mr. Suraj Kumar Behera is grateful to UGC (University Grants Commission), New Delhi, Govt. of India, for financial assistance in the form of RGNF (Rajiv Gandhi National Fellowship).

REFERENCES

1. EL-Kamali HH, EL-Amir MY. Antibacterial activity and phytochemical screening of ethanolic extracts obtained from selected Sudanese medicinal plants. Current Research Journal of Biological Sciences. 2010;2(2):143–146.
2. Vaghasiya Y, Dave R, Chanda S. Phytochemical analysis of some medicinal plants from western region of India. Res J Med Plant. 2011;5(5):567–576.
3. Ivanova D, Gerova D, Chervenkov T, Yankova T. Polyphenols and antioxidant capacity of Bulgarian medicinal plants. Journal of ethnopharmacology. 2005;96(1-2):145–150.
4. Shrikumar S, Ravi TK. Approaches towards development and promotion of herbal drugs. Pharmacognosy reviews. 2007;1(1):180.
5. Jeyachandran R, Mahesh A. Enumeration of antidiabetic herbal flora of Tamil Nadu. Res J Med Plant. 2007;1(4):144–8.
6. Periyasamy A, Mahalingam K. Phytochemical screening and antimicrobial activity from five Indian medicinal plants against human pathogens. Middle East Journal of Scientific Research. 2010;5(6):477–482.
7. Lai PK, Roy J. Antimicrobial and chemopreventive properties of herbs and spices. Current medicinal chemistry. 2004;11(11):1451–1460.
8. Saxena HO, Brahmam M. The Flora of Orissa, Bhubaneswar. Capital business services and consultancy. 1995;3.
9. Haines HH. The botany of Bihar and Odisha, vol I-III, Calcutta: Sri Gauranga Press 1961.
10. Anokwuru CP, Anyasor GN, Ajibaye O, Fakoya O, Okebugwu P. Effect of extraction solvents on phenolic, flavonoid and antioxidant activities of three Nigerian medicinal plants. Nature and Science. 2011;9(7):53–61.
11. Trease GE, Evans WC. Pharmacognosy. W. B. Scandars Company Ltd. London 1989.
12. Sofowora A. Medicinal plants and traditional medicine in Africa. Karthala; 1996.
13. Harborne JB. Methods of Plant Analysis. In: Harborne JB, editor. Phytochemical Methods: A Guide to Modern Techniques of Plant Analysis. Dordrecht: Springer Netherlands; 1984:1–36.
14. Doss A. Preliminary phytochemical screening of some Indian medicinal plants. Ancient science of life. 2009;29(2):12.
15. Ncube NS, Afolayan AJ, Okoh AI. Assessment techniques of antimicrobial properties of natural compounds of plant origin: current methods and future trends. African journal of biotechnology. 2008;7(12).
16. Ofokansi KC, Esimone CO, Anele CR. Evaluation of the in vitro combined antibacterial effect of the leaf extracts of Bryophyllum pinnatum (Fam: crassulaceae) and Ocimum gratissimum (Fam: labiatae). Plant Products Research Journal. 2005;9(1):23–27.
17. Thamaraiselvi P, Jayanthi P. Preliminary studies on phytochemicals and antimicrobial activity of solvent extracts of Eichhornia crassipes (Mart.) Solms. Asian Journal of Plant Science and Research. 2012;2(2):115–122.
18. Sodipo OA, Akinniyi JA, Ogunbameru JV. Studies on certain characteristics of extracts of bark of Pausinystalia johimbe and Pausinystalia macroceras (K Schum) Pierre ex Beille. Global Journal of Pure and Applied Sciences. 2000;6(1):83–88.
19. Okwu DE. Phytochemical and vitamin content of indigenous spices of South Eastern Nigeria. J Sustain Agric Environ. 2004;6:30–34.

Cite this article as:
Suraj Kumar Behera *et al*. Phytochemical screening of some ethnomedicinal plants of Kandhamal district of Odisha, India. Int. Res. J. Pharm. 2019;10(1):190-193
http://dx.doi.org/10.7897/2230-8407.100132

Source of support: RGNF (Rajiv Gandhi National Fellowship), Conflict of interest: None Declared