

Ethnomedicinal uses and Phytochemical analysis of potential Medicinal plants of Bhimkund and its adjoining regions in Mayurbhanj district of Odisha, India

Adarsha Pradhan¹, Ranindra Kumar Nayak^{2*}

¹Department of Environmental Science, Fakir Mohan University, Balasore-756089, Odisha, India

²Centre of Excellence for Bio-resource Management and Energy Conservation Material Development, Fakir Mohan University, Balasore - 756089, Odisha, India

ABSTRACT

Mayurbhanj district of the state of Odisha in India is much rich with indigenous knowledge about the medicinal plants used by various ethnic groups. Bhimkund and its adjoining region in this district are endowed with rich biodiversity. People of these areas are utilizing various plant and plant products for the ailments of various diseases. These areas are endowed with large number of medicinal plants along with plants of other socio-economic importance. During the present investigation, the phytochemicals analysis of some common medicinal plants, qualitative estimation of plant materials such as alkaloids, flavonoids, glycosides, phenols, tannins and saponins were carried out for all the three different type of extracts (ethanol or n hexane or distilled water) which gives evidence on the medicinal properties of these plants. It has been observed that the rich traditional knowledge about the use of medicinal plants for the treatments of various diseases is on the verge of extinction in these areas which should be properly documented for their use in the compilation of Traditional Knowledge Digital Library.

Key words: Ethnomedicinal use, Medicinal plants, Phytochemical analysis, Traditional knowledge

INTRODUCTION

Odisha state in India is endowed with very rich in vegetable wealth due to its peculiar geographical location, topography and diverse climatic conditions. The district of Mayurbhanj in Odisha is rich with luxuriant forests and has different types of medicinal plant resources. About 46 tribal groups inhabit in the district which is 58.7% of the total population of district. According to 2011 census the total population of the scheduled tribe in the district is 1,479,576. Tribal people basically inhabit in an around the deep forest area and they mostly depend on forest resources for their livelihood. It is seen that some tribal groups reside in less accessible areas of the district and lead a primitive life. Each tribe has a different ancient culture and tradition of utilization and conservation of plant resources. Only the medicine man popularly called Vaidya or Kaviraj, old men and women know much more about the traditional uses of their surrounding vegetation. Bhimkund is present on the river Baitarani which is 15 kms away from the Thakurmunda Block of Mayurbhanj district. Along with the river basin and its adjoining regions such as Ranibhul, Saleibeda, Khaparkhai, Sanamahuldiha are rich with medicinal plants. People of these tribal dominated areas rely more on traditional system of healing to their diseases than modern allopathic system of medicines.

From time immemorial people learn the application of different plants and plant parts for the treatment of various diseases. Various medicinal properties have been attributed to natural herbs. Medicinal plants constitute the main source of new pharmaceuticals and healthcare products[1]. Charak and Sushruta, the premier Vaidyas were depending on plants and its product for therapeutic uses. Herbal medicines have become more popular in the treatment of many diseases due to their popular belief that green medicines are safe, easily available and with less side effects. Indeed, the market and public demand has been so great that nowadays there is a great risk to many medicinal plants for their extinction or loss of genetic diversity. This fact is evident from the ethnomedicinal studies conducted by different investigators in the state of Odisha and other parts of India[2-16].

Ethnomedicine is a system of native or indigenous systems of medicine. In rural and tribal areas people depend on traditional medicines based on Indigenous knowledge as their major primary health care system. Medicinal plants have

been used since time immemorial for the treatment of human as well as animal diseases [17]. Ethnomedicine is one of the systems of medicine that is widely practiced by the people various ethnic groups for the cure of various ailments [18]. According to World Health Organization as many as 80% of the world's population depends on traditional medicines and in India, 65% of the population in the rural areas especially those residing in the remote forests mainly rely on the traditional health practices as it is cost effective. Ethnomedicines have gained new dimensions in the present days through phytochemical researches in India and abroad, as information on medicinal plants and folk drugs recorded during field-works are now being subjected to investigations in the search for new biodynamic compounds of therapeutic value [10-11]. The use of medicinal plants in the industrialized societies has been traced to the extraction and development of several drugs from these plants as well as from traditionally used folk medicines.

Phytochemicals can be defined as the chemical compounds that are produced by plants. Natural product is a source of bioactive compounds and has potential for developing some novel therapeutic agents. Over the last decade there has been a growing interest in drugs of plant origin and such drugs have become an important method for control of diseases. Secondary plant metabolites (phytochemicals), with known pharmaceutical activities, have been extensively investigated as a source of medicinal agents [19]. Over 50% of all modern clinical drugs are of natural product origin. The alkaloids, flavonoids, glycosides, phenols, tannins, saponins are different phytochemicals which are isolated from plants. Generally, phytochemicals are responsible for producing different colours, flavours and smell of plants. Their therapeutic values to human health have been reported in the different systems of medicines. Medicinal plants contain components of therapeutic values and hence they are used as remedies for human diseases. The authenticity of the ethno-medicinal values of various plants have been validated by phytochemical analysis conducted by various investigators in India and other parts of the world [16,20-24].

MATERIALS AND METHODS

Study area

Mayurbhanj is a hilly district and present in the North part of Odisha state. It is the largest district of Odisha and extending over an area of 10,418 sq. km. It lies between 21° 17' and 22° 34' N latitude and between 85° 40' to 87° 10' E longitude. This district shares its border with Singhbhum district on the North, West with West Singhbhum District, South East with Balasore, South West with Keonjhar and on the East shares boundary with Medinipur District of West Bengal. The total area of forest cover in the district is about 4392.13 sq. km. It is endowed with some unique features such as Simlipal Biosphere Reserve, Barehipani, Joranda and Debkund waterfalls and some mining activity areas like Badampahad and Garumahisani mines. Tropical moist deciduous forests and the sal forests (dry deciduous) are the dominant vegetation of the district. In the present study, a part of the Similipal biosphere reserve including different areas of Bhimkund and its adjoining regions such as Ranibhul, Saleibeda, Khaprakhai and Sanamahuldiha of the Thakurmunda Block have been surveyed for the assessment of different medicinal plants (Figure-1).



Fig-1: Study Area

Plant Collection and Identification

Plant species were mostly collected in flowering and fruiting conditions and with reproductive characters which are required for the exact identification. The specimens were identified with the help of the regional Flora books viz. The Botany of Bihar and Orissa (Haines, 1921-25) and The Flora of Orissa (Saxena and Brahmam, 1994-96)[25-26].

Local Names

Vernacular names as used by the local people in Odia and tribal languages were recorded during the field visit and plant sample collection.

Ethnomedicinal noting

During the present investigation ethnomedicinal uses of various plants and plant parts by the local people has been documented by interviewing the local elderly people and the local Kaviraj. Every care has been taken to avoid ambiguity as regards to the use of plant parts, quantity, number of doses per day, method of preparation and mode of application etc. It has been authenticated by standard literatures on medicinal plants.

Phytochemical Analysis

The phytochemical analysis has been done by standard methods as follow.

Extraction of plant materials

Near about 30gm of airdried plant material were powdered and were taken in a conical flask containing 200ml of ethanol or n hexane or distilled water and was plugged with cotton wool. Then it was kept on orbital shaker for 48 hrs. with speed of 150 rpm at room temperature. After that extracts were filtered with Whatmann No.1 filter paper and the supernatant was collected. Then it was stored at 4⁰c in air tight containers. The tests for different phytochemicals were carried out for all the three different types of extracts.

Test for Alkaloids:

2ml of plant extract was taken in a test tube and 2 ml of 1% HCL and 6 drops of both Mayer's reagent and Dragendroff's reagent were added to it. An organic precipitate was formed which indicated the presence of alkaloid in the sample.

Test for Flavonoids:

About 10 drops of aqueous extract of plant material was taken in a test tube and 5ml of dilute ammonium solution was added to it. Then little amount of concentrated H₂SO₄ was added slowly. A yellow colour was observed which confirmed the presence of flavonoids and it disappeared on standing.

Test for Glycosides:

5ml of plant extract was taken in a test tube and was treated with 2ml of glacial acetic acid with one drop of ferric chloride solution. Then 1ml of concentrated H₂SO₄ was added over it gently. A brown ring of the interface was formed which indicated the presence of a deoxy sugar of glycosides. A violet ring might appear below the brown ring whereas in the acetic acid layer, a greenish ring might form just gradually through thin layer.

Test for Phenols:

2ml of plant extract was taken in a test tube and 3ml of ethanol was added to it. Then a pinch of FeCl₃ was added to it. A greenish yellow color was formed which indicated the presence of phenols.

Test for Tannins:

5ml of plant extract was taken in a test tube and few drops of 1% of lead acetate were added to it. A yellow precipitate was formed which indicated the presence of tannins.

Test for Saponins:

The plant extract with 20ml of distilled H₂O was agitated in a graduated cylinder for about 15mins. The formation of 1cm layer of foam indicated the presence of Saponins.

Description of different reagents used for the phytochemical analysis:

- Dragendroff's reagent = A+B
A = Bismuth nitrate 1.7gm + Tartaric acid 6gms with 80ml dist. H₂O
B = KI 6gm + 40ml water
- Mayer's reagent = 1.36gm mercury chloride + 5mg potassium Iodide with 100ml water
- 1% HCL
- 1% FeCl₃ = 0.25gm FeCl₃ + 25ml H₂O
- 1% Lead acetate = 0.25gm lead acetate + 25ml H₂O

RESULTS AND DISCUSSIN

During the present investigation, ethnomedicinal studies and phytochemical analysis of medicinal plants have been carried out on the plants which have been collected from different locations of the Bhimkund and its adjoining regions of Mayurbhanj district.

Ethanomedicinal studies have been carried out on the medicinal plants which are available in and around the study area. It has been observed that various plants and their parts such as root, stem, leaves etc. have been used by different ethnic groups for the treatment of various diseases (Table-1).

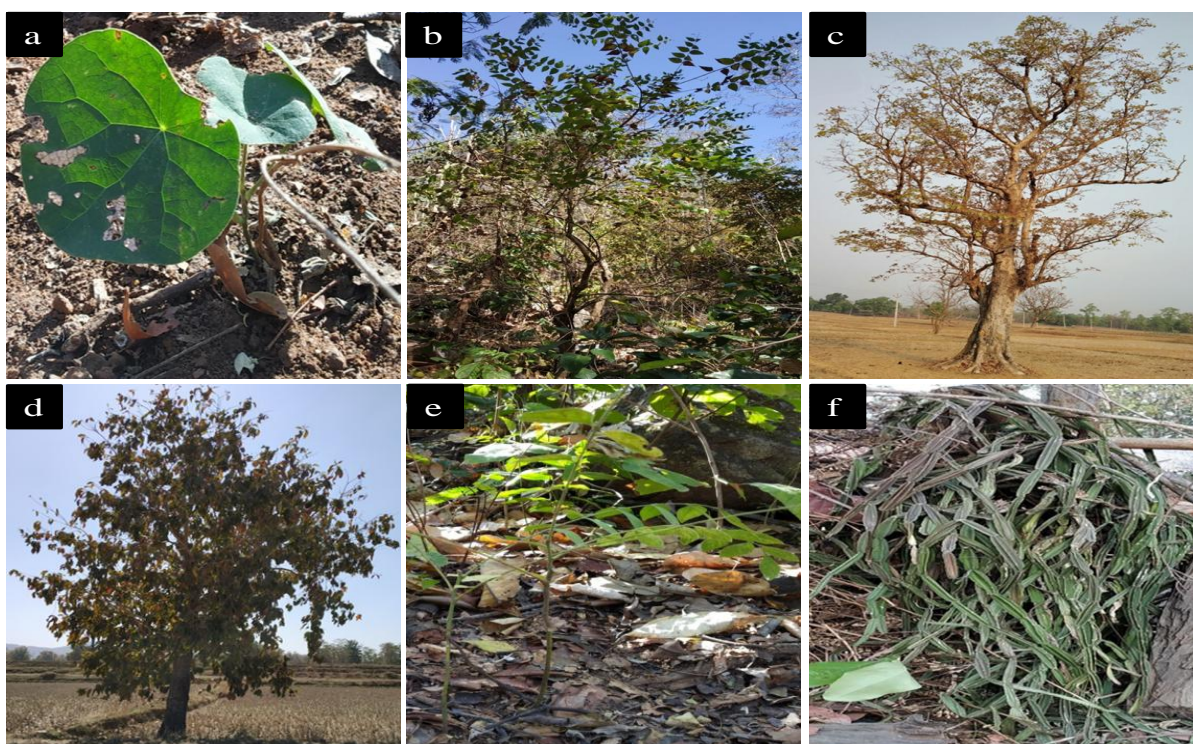
Phytochemical analysis of some potential medicinal plants (Fig.2) has also been done by following standard methods. The qualitative estimation of plant materials such as alkaloids, flavonoids, glycosides, phenols, tannins and saponins were carried out for all the three different type of extracts (ethanol or n hexane or distilled water) which gives evidence on the medicinal properties of these plants (Table-2).All the ethnomedicinal plants have been documented properly which is generally a rich source of traditional knowledge.

CONCLUSION

During the present investigation an indepth study has been carried out on the ethnomedicinal uses and phytochemical analysis of some potential medicinal plants of Bhimkund and its adjoining regions in Mayurbhanj District of Odisha. From this investigation it has been observed that the indigenous and traditional knowledge of the people in this areas on medicinal plants is very rich. People of different ethnic groups of these areas have been utilizing various plants and plant products for the treatment of various diseases.

During the analysis of phytochemicals, it has been observed that variousphytochemicals such as alkaloids, flavonoids, glycosides, phenols, tannins and saponins are present in various parts of plants which have much medicinal value. The quantitative estimation of these phytochemicals will provide more relevant information on the effectiveness of the medicines prepared from different parts of these plants.It will bealso useful to assess the action of the drugs obtained from the particular parts of the medicinal plants against a specific disease.

It has been observed that the rich traditional knowledge of the people of Bhimkund and its adjoining regions in Mayurbhanj District of Odisha regarding the use of medicinal plants for the treatments of various diseases is on the verge of extinction. Proper documentation of this knowledge will be much useful for the development of Traditional Knowledge Digital Library (TKDL) which will provide much useful information for the preparation of herbal medicines for the treatment of common ailments.



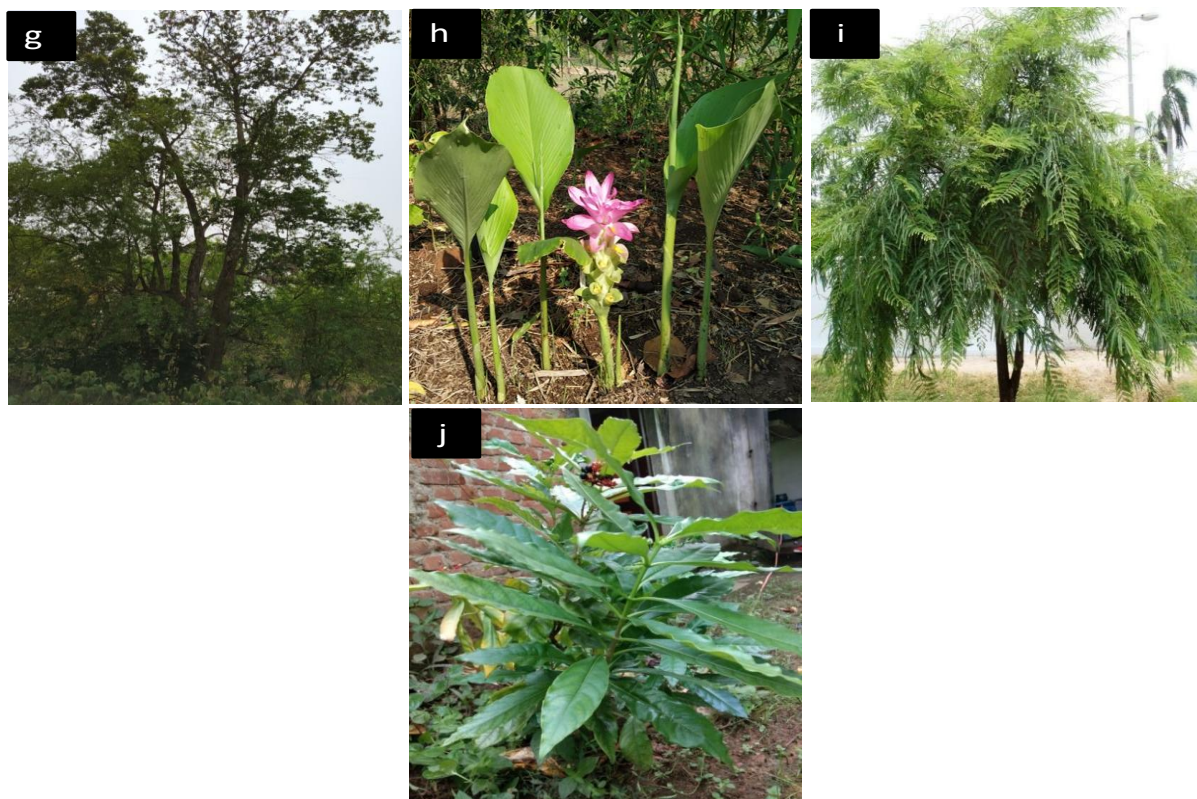


Fig-2: Medicinal plant in Bhimkund and its adjoining regions of Mayurbhanj district, Odisha (a) *Cissampelos pareira* L.(b) *Nyctanthes arbor-tristis* L. (c) *Terminalia bellirica* (Gaertn.) Roxb. (d) *Terminalia chebula* Retz. (e)*Clausena excavata* Burm.f. (f) *Cissus quadrangularis* L. (g) *Strychnos nux-vomica* L. (h) *Curcuma angustifolia* Roxb. (i) *Phyllanthus emblica* L. (j) *Rauvolfia serpentine* (L.) Benth. ex Kurz

Table-1: Ethnomedicinal uses of some potential medicinal plants of Bhimkund and adjoining regions in Mayurbhanj district, Odisha

Sl. No.	Botanical Name	Family	Local name	Uses
1	<i>Cissampelos pareira</i> L.	Menispermaceae	Akandabindu	It is used in the treatment of chronic non healing ulcers and sinuses. It is also used in the treatment of chronic skin diseases and poisonous bites.
2	<i>Nyctanthes arbor-tristis</i> L.	Oleaceae	Gangaseuli	It is used medicinally to provoke menstruation. An extract is given to children for the expulsion of roundworms. The leaf is mostly used for the treatment of malaria fever.
3	<i>Terminalia bellirica</i> (Gaertn.) Roxb.	Combretaceae	Bahada	It is used for the treatment of tract infections, cough and sore throat. It is also used as lotion for soreeyes.
4	<i>Terminalia chebula</i> Retz.	Combretaceae	Harida	It helps in prevention of hair loss, constipation, removes acne, prevents cough and cold, diabetes and fights against skin allergies.
5	<i>Clausena excavata</i> Burm.f.	Rutaceae	Agnijala	It is used in treatment of fevers, headaches and colic. The leaves of this plant have insecticidal property.
6	<i>Cissus quadrangularis</i> L.	Vitaceae	Hadabhanga	It can relieve pain, swelling

				and improve in healing of people with jaw fractures. It is also used for the treatment of obesity and helps in weight loss.
7	<i>Strychnos nux-vomica</i> L.	Loganiaceae	Kuchila	It is used for the treatment of stomach and intestines diseases, heart and blood vascular system disorders, diseases of eye, nerve disorders, lungs disease and anemia. It is widely used for the treatment of different skin diseases.
8	<i>Curcuma angustifolia</i> Roxb.	Zingiberaceae	Palua	It is used to soothe coughs and also used to treat bronchitis. Essential oils are extracted and used in antifungal medications.
9	<i>Phyllanthus emblica</i> L.	Euphorbiaceae	Anla	It has strong antioxidant, anticancer and anti-inflammatory property. It is the excellent source of vitamin C. It is used in problems with hair loss, acne and weight loss.
10	<i>Rauvolfia serpentina</i> (L.) Benth. ex Kurz	Apocynaceae	Patala garuda	The root is widely used in the preparation of Ayurvedic medicines and also used for the treatment of snake bites.

Table-2: Phytochemical analysis of some potential medicinal plants of Bhimkund and its adjoining regions in Mayurbhanj district, Odisha

Sl. No.	Botanical Name Family	Local Name	Plant Parts	Fraction	Alk	Fla	Gly	Phe	Tan	Sap
1	<i>Cissampelos pareira</i> L. (Menispermaceae)	Akandabindu	Root	Ethanol	+	+	+	-	+	+
				N- Hexane	+	-	-	+	+	+
				Dist. Water	+	-	-	+	+	-
2	<i>Nyctanthes arbor-tristis</i> L. (Oleaceae)	Gangaseuli	Leaf	Ethanol	+	+	+	+	+	-
				N- Hexane	-	-	+	+	+	-
				Dist. Water	-	-	-	-	+	-
3	<i>Terminalia bellirica</i> (Gaertn.) Roxb. (Combretaceae)	Bahada	Fruit	Ethanol	+	+	+	+	+	-
				N- Hexane	+	-	-	+	-	-
				Dist. Water	+	-	-	-	+	-
4	<i>Terminalia chebula</i> Retz. (Combretaceae)	Harida	Fruit	Ethanol	+	+	+	-	+	+
				N- Hexane	-	-	-	+	-	-
				Dist. Water	+	-	-	-	+	+
5	<i>Clausena excavata</i> Burm.f. (Rutaceae)	Agnijala	Root	Ethanol	-	+	+	+	+	-
				N- Hexane	+	+	-	+	-	-
				Dist. Water	+	+	-	-	+	+
6	<i>Cissus quadrangularis</i> L. (Vitaceae)	Hadabhanga	Stem	Ethanol	+	+	+	+	+	-
				N- Hexane	-	-	-	+	-	-
				Dist. Water	-	-	-	-	+	+
7	<i>Strychnos nux-vomica</i> L. (Loganiaceae)	Kuchila	Bark	Ethanol	+	+	+	+	+	-
				N- Hexane	-	-	-	+	-	-
				Dist. Water	+	+	-	+	+	+
8	<i>Curcuma angustifolia</i> Roxb. (Zingiberaceae)	Palua	Stem	Ethanol	+	+	+	+	+	-
				N- Hexane	+	-	-	+	+	-
				Dist. Water	-	+	-	-	+	+

9	<i>Phyllanthus emblica</i> L. (Euphorbiaceae)	Anla	Fruit	Ethanol	+	+	+	-	+	+
				N- Hexane	+	-	-	+	-	-
				Dist. Water	-	-	-	-	+	-
10	<i>Rauvolfia serpentina</i> (L.) Benth. ex Kurz (Apocynaceae)	Patala garuda	Root	Ethanol	+	+	+	+	+	+
				N- Hexane	+	-	-	+	-	-
				Dist. Water	+	+	-	+	+	-

N.B:

Alk- Alkaloids Phe- Phenols
Fla- Flavonoids Tan- Tannins
Gly- Glycosides Sap- Saponins

+: presence of a particular phytochemical

- : absence of a particular phytochemical

ACKNOWLEDGEMENTS

Authors of this paper express their gratitude for the support provided by the Centre of Excellence for Bio-resource Management and Energy Conservation Material Development, Fakir Mohan University, Balasore established under the Odisha Higher Education Programme for Excellence and Equity (OHEPEE) for providing necessary research support.

REFERENCES

- [1]. Lvanova, D., Gerova, D. Chervenkov, T.&Yankova,T. (2005). Polyphenols and antioxidant capacity of Bulgarian medicinal plants. *J. Ethnopharmacol.* 96, 145-150.
- [2]. Dash,P. K., Sahoo, S. & Bal, S. (2008). Ethnobotanical Studies on Orchids of Niyamgiri Hill Ranges, Orissa, India. *Ethnobotanical Leaflets.* 12, 70-78.
- [3]. Biswas, S., Sahu, D. K., Dhal, N. K. & Brahmam, M. (2009). Ethnobotany of Gadaba Tribe of Malkangiri District, Orissa, India. *J. Econ. Taxon. Bot.* 33(4), 910-911.
- [4]. Rout, S. D. & Thatoi, H. N. (2009). Ethnomedicinal practices of Kol tribes in Similipal Biosphere Reserve, Orissa, India. *Ethnobotanical Leaflets.* 13, 379-387.
- [5]. Singh, H., Krishna, G. &Baske, P. K. (2010). Plants used in the treatment of joint diseases (rheumatism, arthritis, gout and lumbago) in Mayurbhanj district of Odisha, India. *Report and Opinion.* 2(9), 22-26.
- [6]. Mohanty, R.B., Mishra, N., Tripathy, B.K. & Panda, T. (2012). Traditional Phytotherapy for dental and oral care in Odisha, India. *Journal of Natural Remedies.* 12(1), 47-55.
- [7]. Sahu, C. R., Nayak, R. K. &Dhal, N. K. (2013a). Ethnomedicinal plants used against various diseases in Boudh District of Odisha, India.*Ethnobotany.*25:153-159.
- [8]. Sahu, C. R., Nayak, R. K. &Dhal, N. K. (2013b). Ethnomedicine and Magico-religious beliefs of the Kondh Tribe in Boudh District of Odisha, India. *Life Sciences Lesflets.*11:10-22.
- [9]. Sahu, C.R., Nayak,R.K.&Dhal,N.K.(2014). Indigenous ethno medicine used for treatment of gynaecological disorders by tribals of Boudh district, Odisha, India. *The Journal of Ethnobiology and Traditional Medicine.* *Photon* 121: 743-751.
- [10]. Kumar, M., Alam, M., Khan, H., Kumar, K. & Samiulla, L. (2014a). Ethnomedicinal practices among Rural and Tribal Populations in Dhenkanal District of Odisha, India. *Hippocratic Journal of Unani Medicine.*9(2), 109-117.
- [11]. Kumar, M., Butt, T. A., Hussaini, S. A., Kumar, K., Khan, H. &Samiulla, L. (2014b). Ethnomedicines in the Khordha forest division of Khordha District, Odisha, India. *International Journal of Current Microbiology and Applied Sciences.*3(1), 274-280.
- [12]. Misra, S. & Misra, M. K. (2014). Ethno-botanical study of plant with edible underground parts of south Odisha, India. *International Journal of Agriculture and Food Science.* 4(2), 51-58.
- [13]. Rout, S., Panda, S. P. &Patra, H. K. (2014). Ethnomedicinal studies on Bonda tribe of Malkangiri District, Odisha, India. *International Journal of Biodiversity and Conservation.* 6(4), 326-332.
- [14]. Pani, M., Nahak, G. &Sahu, R. K. (2015). Review on Ethnomedicinal Plants of Odisha for the Treatment of Malaria. *International Journal of Pharmacognosy and Phytochemical Research.* 7(1), 156-165.
- [15]. Pradhan, M.K.& Nayak, R.K. (2017). Ethnobotanical study of Malyagiri hill ranges, Odisha, India.*e-planet* 15(1) :84-92.
- [16]. Kumar, N & Khurana, S.M.P. (2018). Phytochemistry and Medicinal potential of the *Terminalia bellirica* Roxb. (Bahera). *Indian Journal of Natural Products and Resources.* 9(2), 97-107.
- [17]. Sen, S. K. & Behera, L. M. (2016). Some ethnomedicinal plants used against high blood pressure in Bargarh district in Western Odisha (India). *Tropical Plant Research.* 3(3), 517-521.
- [18]. Padal, S. B.&Raju, J. B. (2013). Ethnomedicinal Plant Uses by Tribals of Rayagadda District, Odisha State, India. *International Journal of Innovative Research and Development.* 2(5), 1299-1309.

- [19]. Paikara D, Sing S& Pandey B.(2015). Phytochemical Analysis of Leave Extract of *Nyctanthes arbortristis*. *IOSR Journal of Environmental Science, Toxicology and food Technology*.1(3): 39-42.
- [20]. Gupta P.C.(2012). Biological and pharmacological properties of *Terminalia chebula* Retz. (Haritaki)- An overview. *International Journal of Pharmacy and Pharmaceutical Sciences* 2012: 4(3): 62-68.
- [21]. Bhati R., Singh A., Saharan V.A., Ram V.& Bhandari, A. (2015).*Strychnos nux- vomica* seeds: Pharmacognostical standardization, extraction, and antidiabetic activity. *Journal of Ayurveda & Integrative Medicine* 2015: 3(2): 80-84.
- [22]. Deb A., Barua S.& Das B.(2016). Pharmacological activities of Baheda (*Terminalia bellerica*): A review. *Journal of Pharmacognosy and Phytochemistry*. 5(1): 194-197.
- [23]. Hasan MdR, Islam MdN&Islam MdR.(2016). Phytochemistry, Pharmacological activities and traditional uses of *Emblica officinalis*: A review. *International current pharmaceutical Journal* 2016:5(2): 14-21.
- [24]. YadavP. (2016). Phytochemical Screening of ethanolic extract of *Cissus quadrangularis*. *Journal of Medicinal Plants Studies*.4(4): 287-289.
- [25]. Haines, H.H. (1921-25). *The Botany of Bihar and Orissa*, 6 parts, London.
- [26]. Saxena, H.O. & Brahmam, M. *The Flora of Orissa*, Vol. (1-4). (1994-1996). Regional Research Laboratory and Orissa Forest Development Corporation Ltd., Bhubaneswar, India.