



E-ISSN: 2321-2187
P-ISSN: 2394-0514
IJHM 2018; 6(6): 01-09
Received: 02-09-2018
Accepted: 04-10-2018

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An Ethnobotanical Assessment of some Medicinal plants in Pradhanpat waterfall and its adjoining regions of Deogarh (Odisha), India

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Abstract

The present investigation is intensive as well as extensive floristic ethnobotanical studies conducted in the Pradhanpat waterfall and its adjoint region of Deogarh District of Odisha. From the study, it is evident that the Traditional indigenous knowledge regarding different medicinal plant is very sound. The ethnic groups are still utilizing various plants and plant products for the treatment of various diseases like Malaria, typhoid, diarrhoea, cholera, worm infection, jaundice, diabetes, dysentery, skin diseases, cold and cough, snake bites, asthma, piles, constipation, wound etc. In this present contest, it has to be identified the underutilized medicinal plants and plant products which provide relevant information regarding the Indigenous knowledge of the traditional people. It will be much useful for patenting the plants and plant products, which is an urgent need of the hour.

Keywords: Ethnobotany, Medicinal plants, Indigenous, Ancient, Traditional.

1. Introduction

The study of the interaction between plants and the people with reference to traditional knowledge of tribal people is known as ethnobotany. To record the indigenous uses of plant and plant products is the main objectives of ethnobotanical research. The plant having properties to cure the disease and have same properties of Pharmaceutical drugs are called medicinal plants. Basically, these plants are rich in those ingredients which are used in the preparation of medicine ^[1]. Medicinal plants are being used for the treatment of various diseases by the tribal people since generation. Medicinal plants are the essential part of human health care system because of less expensive, lesser side effect and toxicity ^[2]. Sometimes, the medicine is also called herbal medicine due to its properties. The tribal people prefer to use medicinal plant and plant based medicine because of the cheap price and easy availability as compared to costly pharmaceuticals ^[3]. These people have inherited indigenous knowledge of medicinal plant from their ancestors since time immemorial; and they discover the therapeutic activity of medicinal plants against diseases through their traumatic experiences ^[4]. The rudimental knowledge of medicinal plants is scientifically and culturally very significant to the society. According to the local people, plants not only have nutritional value but also have medicinal and ritual values. These plants play a vital role in the development of drugs. The plants having medicinal properties should be utilized carefully before they become extinct for all times to come. According to WHO, three-fourths of the world population depends upon the traditional medicines? About 60% of modern clinical or allopathic drugs are plant based origin. Hence; they play an important role in the pharmaceutical science. The whole world has inclined their attention towards the use of herbal medicines. Hence, high priority should be given to the documentation of this indigenous knowledge of plants for their conservation as well as propagation for a Holistic health care system that will help present and the posterity ^[5, 6]. The main objective of this study is to identify and assess the indigenous knowledge of the medicinal plants present in the Pradhanpat waterfall and its adjoint region of Deogarh District of Odisha. And to popularize the use of these plants for preparing low cost medicines

The present piece of work has following objectives

- To identify the medicinal plants and determine their present status
- To impart knowledge to the society of the present and for future generation
- To gather ethnobotanical information from the local ethnic groups of this region
- To promote ecotourism in this region

2. Materials and Methods

Study Area: Deogarh District is located in the north-western part of the state and it is one of the 30 administrative districts of Odisha. It is connected with NH6 and NH200. The city is 90 km distance from Sambalpur and 265 km from Bhubaneswar. The district is entirely a hilly region. The soil groups of this district are mainly sandy, loamy and red. The district covers an area of 2781.66 km² with forest land 1560.22 km² and population around 312,164. Among various biodiversities, "Pradhanpat" and "Kurukuti" waterfalls, a rich

and ecological balanced location, have a tremendous historical importance. Kurukuti is one of the earliest places where hydroelectricity was generated in Asia. Pradhanpat waterfall is surrounded by hills and dense forest. The water dropping is just like spraying someone from the top of the hill and this is one of the best waterfalls in Odisha. In the whole year, we can see people coming here for its scenic beauty and to enjoy its alluring sight of nature. From tourism point of view, this place has been well maintained with abundant facilities required for the tourist.

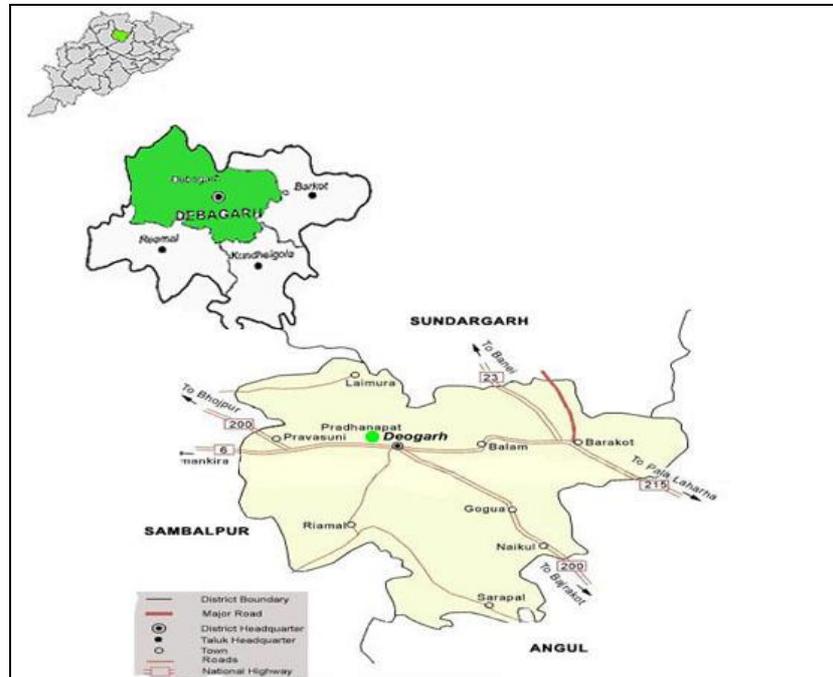


Fig 1: Location of study area

Field Survey: The study involved intensive exploration and study of specimens.

Plant collection and identification: Plant species were mostly collected in flowering and fruiting condition with their reproductive characters for their identity.

Local Names: Vernacular names as employed by the local people in Odia and tribal languages have been recorded.

Plant Description: All the species described are based on personal observations and critical study of the specimen in the herbarium denoting "common", "occasional", "rare", "planted" & "cultivated" species.

Other features are highlighted such as habitation, the timing of flowering and fruiting.

Ethnobotanical notes: A brief note about the uses of the plants by the people of this locality has been illustrated. A minute care has been given to avoid ambiguity as regards to plant parts and has been authenticated by standard literatures on medicinal plants [7, 8].

Observation

1. *Nyctanthes arbor-tristis*, Local Name:- Gangaseoli, Family:-Oleaceae

Small trees, flaky grey bark. Leaves ovate, entire, acute, glabrous, very scabrous and petiolate. Fragrant flowers, eight-lobed, white corolla with an orange-red centre. Capsule

elliptic compressed, glabrous, seed orbicular. Flowering occurred between Sept-Oct and Fruiting between Dec-Jan.

2. *Andrographis paniculata*, Local Name: – Bhunimba, Family:-Acanthaceae

Herb, Erect, glabrous, about 2 feet long, stem square. Leaves sessile, linear-lanceolate, about 4.9 cm long. Acute apex, glabrous. Flowers pedicelled, white purple colour, solitary and erect, spreading, lower branches arise from the axis of ordinary leaves. Pedicels small, glandular. Calyx-lobes subulate, glandular. Filaments hairy, anthers purple colour, bearded at the base. Seeds rugose. Flowering & Fruiting occur between Sept.-May.

3. *Achyranthes aspera*, Local Name:- Apamarga, Family:-Amaranthaceae

Herb, Erect, straggling herb. Leaves ovate, elliptic, obovate, acute, obtuse, base narrowed, petiole up to 2.5cm, Spikes long, polished green colour flowers, bracteole spinescent, membranous blade, entire adnate. Tepals lanceolate, very pungent tips, fruiting tepals, detaching together with the bracteoles but leaving the reflexed bracts. Utricle broadly oblong or slightly wider above, Flowering & Fruiting occurs between Oct.-Feb.

4. *Rauwolfia serpentina*, Local Name:- Patal garuda, Family:- Apocynaceae

Undershrub, glabrous, about 2 feet long. Leaves whorled and opposite, elliptic-oblong, oblong, obovate, acute to acuminate,

glabrous, bright green colour, often paler beneath, membranous, petiolate. Flower small, white with pink tube, terminal, peduncle bright red cymes, bright red pedicle, and minute bract, Corolla-tube slender, long, and curved. Drupes black when ripe, globose. Flowering & Fruiting occur between May-Nov.

5. *Tinospora cordifolia*, Local Name:- Gulachilata, Family:-Menispermaceae

Woody climber, branchlet glabrous, slender, pendulous, fleshy roots. Leaves cordate, glabrous, glandular papillose patches in the basal nerve axis on lower surface of leaf, entire margin, and acuminate apex, petiolate. Pseudoracemes axillary, shorter. Male Flowers-clustered in the axis of minute bracts, pedicel filiform. Sepal outer, ovate, inner sepal elliptic. Petal 6, green, free, obovate, reflexed. Stamens covered by petal. Anther longitudinally dehiscent. Female flower – solitary racemes, outer sepal lanceolate, inner sepal obovate, petals broadly spatulate. Carpel 3, style stout. Drupes red, globose. Flowering occur between Aug-Dec & Fruiting occur between March-May.

6. *Justicia adhatoda*, Local Name:- Basango, Family Name:-Acanthaceae

Shrub, about 4 to 8 feet long. Large leaves, elliptic – lanceolate, long, acuminate, minutely pubescent, basecuneate, petiolate. White flowers, subsessile, large, axillary and terminal, bracts ovate. Calyx 5 lobe, lanceolate, imbricate. Corolla 2-lipped, tube short, upper lip galeate, subentire, lower spreading 3-lobed. Stamens 2, filament hairy, anther cells entire. Capsule oblong, pubescent, long solid base. Seed 1-2, suborbicular, rugose, and compressed. Flowering & Fruiting occur between June-Feb.

7. *Desmodium gangeticum*, Local Name:-Saloporni, Family:- Papilionaceae

Undershrub, diffusely branched, about 3.5 feet tall. Stem is short and appressed hairy. Leaves are unifoliate, lanceolate, oblong, acute gray silky, glaucous, base rounded. Petiolate, stipulate. Inflorescence is elongated, lax, terminal or axillary raceme. Flowers purple, elongate, slender axillary, pedicellate. Calyx, teeth as long as tube, lanceolate, hairy. Fruit is a pod, beaded, six to eight jointed. Flowering and fruiting occur twice a year, from May to Jan.

8. *Paederia foetida*, Local Name:- Prasarini, Family:- Rubiaceae

Climbing shrub, twisted petioles. Leaves elliptic-ovate, oblong, narrow-ovate, acute, glabrous, and hairy with glands, base rounded petiolate. Flowers purple, funnel shape, axillary and terminal, cymose, pubescent panicles. Calyx-lobes, small, obtuse, ciliolate. Corolla –lobed oblong, one-fourth the length of the tube, with white incurved, crisped margin, tube glandular. Fruits elliptic, compressed, polished, red thin epicarp, fragile, veined. Flowering & Fruiting occur between Aug-Oct.

9. *Aegle marmelos*, Local Name:-Bela, Family:-Rutaceae

Medium sized tree; spines, axillary, strong. Petiole long about 6cm. leaflets ovate, ovate-lanceolate 3-foliate, ovate-lanceolate, leaf terminal one larger and two smaller, entire, obtuse, glabrous and petiolate. Flower greenish-white, subterminal simple panicles. Fruits globose, woody, seeds present in clear mucilage, aromatic pulp. Flowering occurs between march-April & Fruiting ripening after one year.

10. *Azadirachta indica*, Local Name:-Limba, Family:- Meliaceae

Tree, compound Leaves, leaflets 5-9 pairs, obliquely lanceolate, acuminate, glabrous, serrate, base cuneate. Flowers white, fragrant. Staminal-tube long. Drupe ellipsoid yellow, glabrous, 1-seeded. Flowering occurs between Feb-May & Fruiting occur between June-July.

11. *Melia azedarach*, Local Name:-Mahanimba, Family:- Meliaceae

Medium tree, about 20-40 feet long thick bark, smooth in young. Leaves are compound, mostly 3-pinnate, opposite; ovate-lanceolate, serrate, acuminate, glabrescent, dark green. The inflorescence is a panicle from leaf axils. Sepals green; Petals are pinkish lavender, ligulate, 1-1.3 cm long. Flowers lilac, small and fragrant, with five pale purple, growing in clusters, stamina tube, light yellow colour when mature, drupe yellowish, ellipsoid, hard endocarp. Flowering occurs between March-June & Fruiting occur between Oct-Dec.

12. *Terminalia chebula*, Local name: - Harida, Family:- Combretaceae

Tree, dark grey bark. Leaves are sub-opposite, entire, acute, base rounded, silky hairy when young, glabrous, petiolate. Flowers whitish with strong odour. Spikes, pubescent. Fruit is yellowish-green, ellipsoid, glabrous, hard, and five ribbed. Seed is globose, pale yellow in color. Flowering occurs in March-April, while fruiting occurs in winter (November-December).

13. *Terminalia bellirica*, Local Name:- Baheda, Family:- Combretaceae

Tree, dark grey bark, leaves clustered at end of the branchlets, alternate, leathery, dotted, obovate, entire, subacute apex. Flower greenish-white, solitary axillary. Calyx tube copular, triangular, upper flowers of the spike are male, lower flowers is bisexual. Stamens along. Drupes subglobose, grey tomentose. Flowering occurs between March-May & Fruiting occur between Oct-Dec.

14. *Phyllanthus emblica*, Local Name:-Anola, Family:- Euphorbiaceae

Medium size deciduous tree, light grey bark, branchlets hairy. Leaves linear, margined apiculate, glabrous, petiolate, stipulate fimbriate. Flowers monoecious and yellowish, minute in axillary fascicles, male and females mixed, in some plant female in lower axis and male in upper axis. Tepals 6, copular in female. Males flowers:-pedicels slender, stamen-3, filament connate, anther free. Female flowers: subsessile, ovary 3 celled ovule-2 style 2-fid. Drupe globose, succulent, green in young and pale yellow when ripe, 6 ridged putamen. Flowering occurs between Feb-May & Fruiting occur between Oct-Jan.

15. *Schleichera oleosa*, Local Name:- Kusum, Family:- Sapindaceae

Trees, fluted trunk, thin bark. Leaf paripinnate, leaflets 2-4 pairs, opposite, sessile, elliptic, entire, rarely repand, obtuse, acuminate, glabrous. Inflorescence racemes, axillary and below the leaves, flowers yellowish, small. Stamens 6, filaments glabrous. Ovary 3 celled, basal placentation. Drupe ovoid, sharply pointed. Seed slightly compressed brown, thick seed coat. Flowering occurs between Feb-March & Fruiting occur between June-Aug.



Fig 2: *Nyctanthes arbor-tristis*



Fig 3: *Andrographis paniculata*



Fig 4: *Achyranthes aspera*



Fig 5: *Achyranthes aspera*



Fig 6: *Tinospora cordifolia*



Fig 7: *Justicia adhatoda*



Fig 8: *Desmodium gangeticum*



Fig 9: *Paederia foetida*

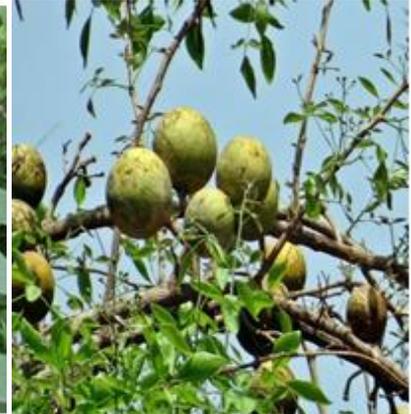


Fig 10: *Aegle marmel*



Fig 11: *Azadirachta indica*



Fig 12: *Melia azedarach*



Fig 13: *Terminalia chebula*



Fig 14: *Terminalia bellirica*



Fig 15: *Phyllanthus emblica*



Fig 16: *Schleichera oleosa*

3. Results

Plants have different medicinal value for the treatment of various disease which are shown in Table 1. It shows 15 medicinal plant distributed in 15 genera belonging to 12 families that are usually used for the treatment of various diseases (Fig.18). As per the habit, the plants used by the people of this locality are trees, shrubs, herbs and Climber. Among them 8 species are trees, shrubs (3species), herbs (2species) and climbers (2species). (Fig.17). The present work deals with 15 plant species used by the people of this locality for treatment of various diseases like Malaria, typhoid, diarrhoea, cholera, jaundice, diabetes, dysentery, skin diseases, cold and cough, snake bites, asthma, piles,

constipation, worm infection, teeth infection, joint pain and chicken pox (Fig.19). The medicinal value of each plant is categorically enumerated as pattern like; Local name, Scientific name, Family, plant parts used, Disease and mode of application. Different parts of medicinal plants are being used to prepare medicines by the people of this region. Among them leaves are mostly used (27%) followed by roots (20%), Fruits (12%), seeds (12%), whole plant (9%), stem barks (8%) and stem (6%) (Fig.20). The various Method of preparation of medicine involves Decoction (26%), Paste (24%), Crushed form (17%), oil (12%), raw (8%), Juice (7%) and powder (6%) (Fig.21).

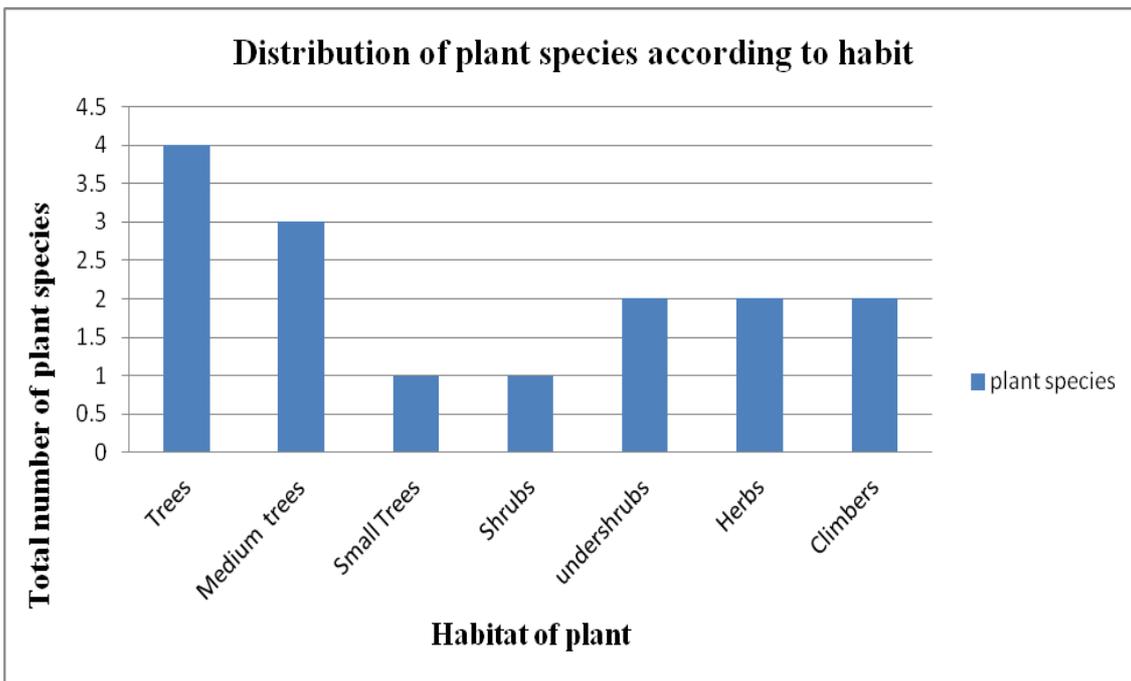


Fig 17: Distribution of plant according to their habit

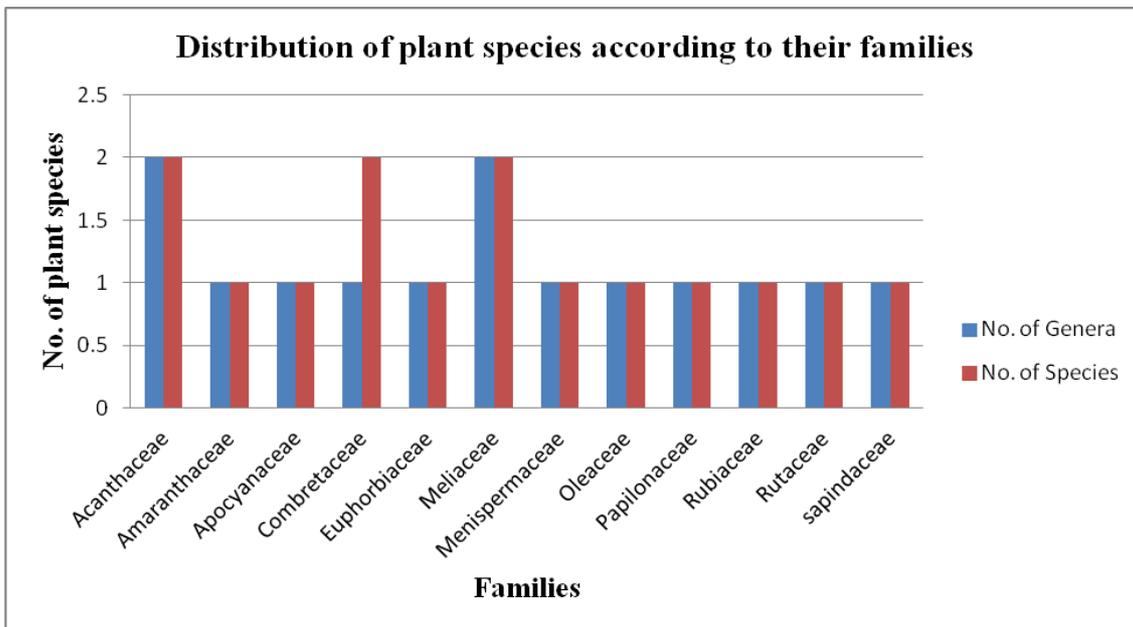


Fig 18: Distribution of plant according to their families

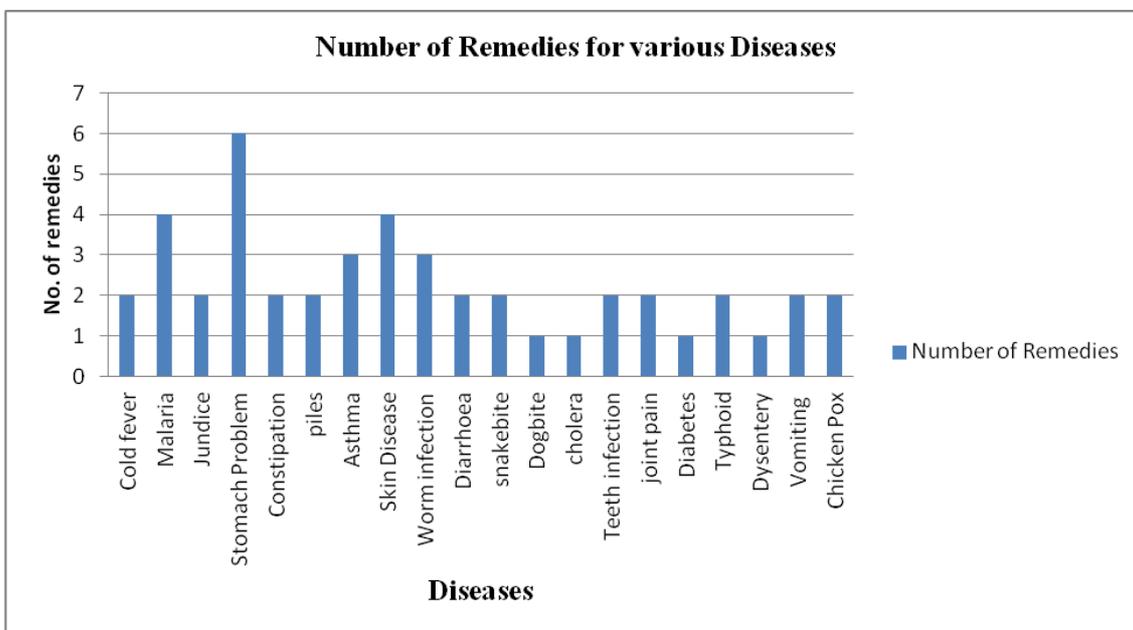


Fig 19: Number of remedies for various diseases

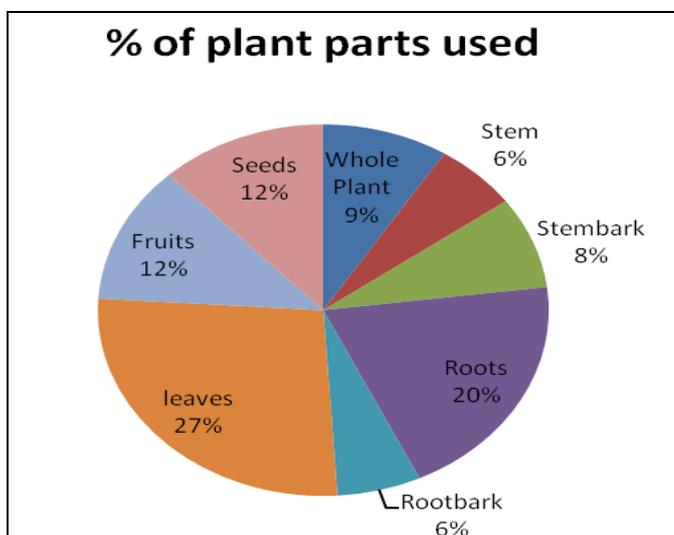


Fig 20: Plant parts used by the traditional people

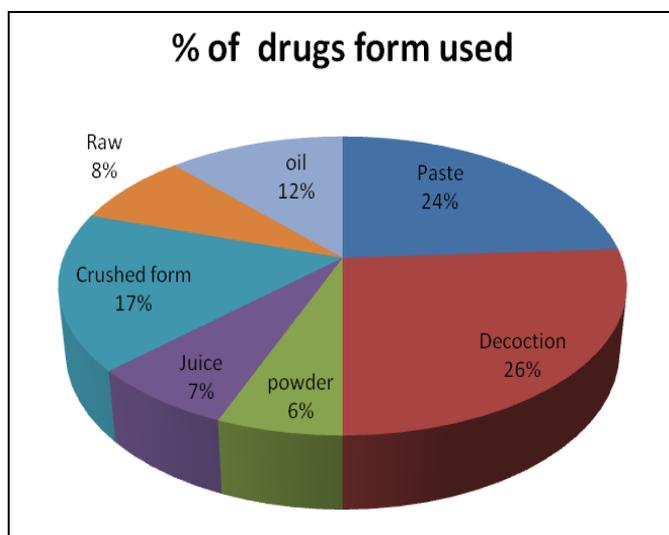


Fig 21: Various methods of application of drugs

Table 1: List of Medicinal plants used by local people

Sl. No.	Local name	Scientific name	Family	Plant part used	Plants Used for Treatment of	Mode of application
01	Gangaseoli	<i>Nyctanthes arbor-tristis</i>	Oleaceae	Stem bark and leaves	1. Cold 2. Cough 3. Malaria 4. Bronchitis	1. Decoction of stem bark with common salt and honey is taken in empty stomach to cure acute diseases like cold, cough and fever. 2. To cure malarial fever decoction of shoot tips mixed with honey should be taken once a day in empty stomach for 7 days.
02	Bhunimba	<i>Andrographis paniculata</i>	Acanthaceae	Whole plant, Leaves and roots	1. Malaria 2. Worm infection of Child 3. Skin Infection 4. Swelling of foot 5. Jundice and Piles 6. Snakebite	1. Fresh fruit paste mixed with honey can be orally taken to cure malaria. 2. Leaf decoction is taken orally for seven days to kill intestinal worms. 3. Leaf paste with turmeric cure itches. 4. Whole plant is ground to paste and filtrate to get Juice. The juice can be used orally half cup per day, upto 4-5 days to get relief from fevers and swelling of foot in case of newly delivered mothers. 5. The whole plant is used for fresh juice to cure piles and jaundice. 6. The paste of root is applied on wounded area for snakebite.
03	Apamarga	<i>Achyranthes aspera</i>	Amaranthaceae	Root, stem and seed	1. Teeth infection 2. Vomiting 3. Dysentery 4. Dog bite 5. Cholera	1. To cure tooth infection the leaf along with salt can be applied on teeth 2. Leaf paste is administered to stop vomiting. 3. Juice of root with sugar in water is taken twice a day until relief from dysentery. 4. The fruits paste is applied for mad dog bite. 5. The powdered root of the plant is useful for cholera. 6. Decoction of boiled root is given orally with honey to pregnant mothers which help in quick delivery of child.
04	Patal goruda	<i>Rauvolfia serpentina</i>	Apocyanaceae	Root and leaf	1.Snake Bite 2.Malaria 3.Colic pain	1. The paste of root is applied to cure snake and scorpion bite. 2. Leaf extract mixed with the juice of <i>Andrographis paniculata</i> and bark of <i>Azadirachta indica</i> is given with honey to drink for seven days continuously to cure malaria. 3. Root extract is given three times a day for two to three days to cure from colic pain.
05	Gulachi lata	<i>Timospora cordifolia</i>	Menispermaceae	Leaves, steam and bark	1. Acidity 2. Jaundice 3. Diabetes	1. Decoction of leaf with common salt is taken in empty stomach once a day for one month to cure from acidity in stomach ^[8] .
06	Basango	<i>Justicia adhatoda</i>	Acanthaceae	Root and Leaves	1. Respiratory disorder like; asthma, bronchitis, coughing and tuberculosis. 2. Piles	1. Decoction of leaves in small amount is taken daily for three weeks to cure asthma. 2. Decoction of the leaves is given with honey twice for 7 days to cure asthma and cough. 3. The root paste with leaf paste of <i>Achyranthes aspera</i> is taken twice a day after meal for twenty days controls piles.
07	Saloporni	<i>Desmodium gangeticum</i>	Papilionaceae	Leaves Root	1.Typhoid 2.Asthma 3. Burning sensation in urine	1. Decoction of fresh leaf is taken in empty stomach once for seven days against typhoid and other fever ^[8] . 2. Fresh root juice about 50 ml is taken twice a day orally for asthma ^[9-10] .
08	Prasarini	<i>Paederia foetida</i>	Rubiaceae	Whole plant, Leaves	1.Fever 2. Abdominal pain, arthritis and joint pain.	1. Decoctions of leaves are given orally to control fever and gout. 2. The powder of whole plant is taken twice a day for seven days during weakness to get strength and relief from joint pain. 3. The fresh leaf paste is taken along with rice cake to cure abdominal and joint pain.

09	Bela	<i>Aegle marmelos</i>	Rutaceae	Leaves, root and fruit	1. Diarrhoea 2. Diabetes 3. Constipation and piles 4. Indigestion	1. Burned fruit pulp is mixed with honey and dried ginger orally taken to cure diarrhoea. 2. Three to four leaves are prescribed daily in empty stomach to control diabetes ^[11] . 3. The ripe fruit pulp juice is taken for constipation. 4. Ripe fruit pulp is taken in the morning twice a day for 2-3 days to improve digestion.
10	Limba	<i>Azadirachta indica</i>	Meliaceae	Whole plant, Leaf, flower, bark, Seed oil.	1. Intestinal infection 2. Skin disease 3. Antibacterial antifungal 4. Acne 5. Chicken pox 6. Malaria 7. Mosquito repellent	1. Leaf extract is given as a blood purifier and for the removal of intestinal worms. 2. Leaf paste is applied on skin diseases and for the treatment of small pox. 3. The leaves are used as antifungal, antibacterial, antiviral, contraceptive medicine and for skin diseases. 4. Seed oil is useful for acne treatment. 5. Patients suffering from chicken pox are recommended to sleep on Neem leaves. 6. Seed oil is applied on body as a mosquito repellent.
11	Mahanimba	<i>Melia azedarach</i>	Meliaceae	Leaves, Root bark	1. Skin disease 2. Tooth Problem 3. Vermifuge 4. Ringworm and other parasitic skin diseases.	1. The paste of leaves are used externally for treatment of skin conditions such as scabies and itch. 2. A decoction of leaves are used as a gargle to treat tooth problems and strengthen the gums. 3. The root bark paste is vermifuge. 4. The paste of leaves are highly effective against ringworm and other parasitic skin diseases.
12	Harida	<i>Terminalia chebula</i>	Combretaceae	Fruits And stem	1. Digestive disorder 2. Mouth wash 3. Stomach pain 4. Diarrhea.	1. The powder of Fruits is used for acidity, digestive disorders and indigestion. 2. Stem and fruit are chewed for mouth wash, Stomach pain and diarrhoea
13	Baheda	<i>Terminalia bellirica</i>	Combretaceae	Fruits and seed oil	1. Vomiting 2. Body pain 3. Asthma 4. Hair Growth 5. Indigestion 6. Constipation.	1. Decoction of fruit is taken to stop vomiting. 2. Seed oil and fruit paste are applied on painful part of the body for relief. 3. Seed extract is taken daily in small amount for asthma. 4. The seed oil is used for growth of hair 5. The powder of fruits is used for indigestion. 6. The unripe fruit is used as a laxative in cases of chronic constipation.
14	Anola	<i>Phyllanthus emblica</i>	Euphorbiaceae	Fruits And juice	1. Indigestion. 2. Acidity 3. Stimulate hair growth.	1. Fruits are used to cure acidity, purify the blood, stimulate hair growth and also cure all stomach problems 2. The powder of the fruit helps to cure indigestion.
15	Kusum	<i>Schleichera oleosa</i>	Sapindaceae	Root Bark and oil	1. Skin disease 2. Joint pain 3. Cold fever 4. Ear problems 5. Stimulate Hair growth	1. Warm seed oil applied to cure itches, scabies and acne. Fruit paste is used in skin itching. 2. Seed oil is applied gently on affected portion to cure rheumatism. Oil massages relief joint pain. 3. Seed oil is heated with two to four pieces of garlic and used as ear drop. 4. Oil is used in hair dressing and to promote hair growth.

Discussion

During the present investigation extensive as well as intensive exploration was carried out covering different parts of its area. Information was collected on the basis of availability of medicinal plants and their uses in different indigenous therapy. Besides, the plants and their parts are used by skilled and unskilled people including their effects, side effects and negative effects on the human body which has been recorded properly. It has been observed that the rich rudiment knowledge of the medicinal plants of this region has not been recorded properly and as such there are chances of the loss of this knowledge due to the advent of the modern allopathetic system of medicines. As such this rich primitive

knowledge on the medicinal plants of this locality should be incorporated in the Traditional Knowledge Digital Library (TKDL) of India for the use of the future generation.

This work needs further study, to derive the full potential of these plants. The information which is helpful for the future generation is incomplete and it should be resurrected from the verge of extinction.

Conclusion

The area of investigation is rural in nature; and the local people are highly dependant on the native plants for their health care and other requirements due to unavailability of resources. The prepared medicine by them is cost effective

and easier to access. Moreover, this remedy does not produce any side effects as per their claims, but till now no validation is done. To test the scientific validity of the herbal preparations clinical studies are vehemently required, which will be able to establish medicinal values from this preparation for the benefit of humanity.

Identification of these underutilized medicinal plants and plant products provide relevant information regarding the Indigenous Knowledge of the people of this locality. It will be more useful for patenting the plants and plant products, which is an urgent need of the hour. At present day, traditional practitioner are very old and aged. Due to lack of interest among the younger generation as well as their tendency to migrate to cities for lucrative jobs, there is a possibility of losing this treasure-trove in future. Thus, it becomes necessary to inculcate and preserve this primitive knowledge by proper documentation and identification of species.

Acknowledgments

The authors are very much thankful to all the Faculties of both Palsama Science Degree College and Junior college, Deogarh, Odisha, for participating in the research and sharing their valuable traditional knowledge. Authors pay special thanks to the local people for their great support and cooperation in the field study.

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