

Exploration of Phytochemicals in herbs popular among tribal people of Gajapati district: A study

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Abstract:

India, being one of the world's oldest civilizations, has a long tradition of using native and exotic flora in the preparation of medicine. The objective of the present study is to document diverse belief systems of these indigenous communities and more importantly, how they use nature to heal themselves and their livestock. For this, a survey was carried out among the tribals of Mohana region of Gajapati district. Plants and herbs are quite familiar with the tribals that they use for their as well as their livestock healing with effortless ease. The plants belonging to the families of Acanthaceae, Amaranthaceae, Amaryllidaceae, Apocynaceae, Asphodalaceae, Cannaceae, Crassulaceae, Euphorbiaceae, Marsileaceae, Papaveraceae, Phyllanthaceae, Plantaginaceae, Rubiaceae and verbanaceae are used by tribals as a tried and trusted method of treating ailment and diseases. Phytochemicals present in the medicinal herbs like flavonoids, polyphenols, alkaloid, tannins, coumarins etc are found. Along with these, some plant specific phytochemicals such as mimosine, withanine, Cuscutin, Cucurbitacin, Piperine, piperettine, Achuranthine are also found in the plant parts. The indigenous tribes handed down this knowledge in the form of folk traditions, but it is slowly dissipating due to emergence of modern medicine, forest degradation and lack of employment for younger generation. These major issues are to be addressed if we want to realise the true potential of traditional tribal or folk herbal medicines.

Key words: Phytochemicals, ethnobotany, flora, medicinal herbs

Introduction:

Herbs are plants having soft, green and delicate stem. These are usually short-sized bushy plants. Herbs have been used by humans extensively for medicinal purposes which are full of phytochemicals. Fondness for use of herbs is also due to accessibility and ease of collection of plant parts. These medicinal herbs are not only one of the most commonly mentioned plant types in ancient writings but also ubiquitous in the modern manifestation of those systems. For example, Ayurveda heavily focuses on about 600 herbs currently for its various formulations. This paper explores the medicinal herbs found in the Mahana region of the Gajapati district. All the plants are identified according to Bentham and Hooker's classification system. A specimen of each species was collected (or) photographed. The whole plant along with the root is collected. The information about the diseases for which the plants are used and plant parts responsible for treating them are also collected. The investigators have personally participated in the process of treatment of the village vaidyas and are really moved by the amount of trust the tribals repose in these methods of treatment using plants and herbs. more than the modern medicine which is expensive as well as out of reach of these tribal people, they are getting remedy of even some deadly diseases through the use of plants and herbs which are both affordable and accessible to these rather innocent tribal people. They get remarkable results with a minimal cost. If we can exploit these findings of the use of plants and herbs as medicine, we can get a thriving market for Ayurveda.

Besides, it is cost effective, free from side effects and accessible. It is high time we explored the hidden treasure of these medicinal plants and herbs for the benefit of one and all.

Objectives:

1. To collect the medicinal herbs of the study area and to make permanent records for the preservation of specimens.
2. To identify and collect the information about the local names and traditional uses of different species used by the people of the tribal area, Mohana of Gajapati district.
3. To categorize these species according to their uses with the presence of phytochemicals.




Material and methods:





STUDY AREA: India is a country with rich flora and fauna. Odisha is situated in the eastern part of India having 30 districts. Gajapati is one of the 30 districts of Odisha, which is covered by hills, mountains and undulated topography inhabited by mostly the Saura tribe. Gajapati district constitutes a part of the Eastern Ghats of India. Mohana is the most populous and developed tribal region which is situated towards the south of the district. The district is lying between 18.460 to 19.390 N lat. and 83. 480 to 84.000 E long. Gajapati is surrounded by Andhra Pradesh in south, Ganjam district in the east, Rayagada district in the west, and Ganjam and Phulbani districts in the north. Vansadhara and Mahendratana are the two major rivers of this district. The total forest area of Gajapati district is 2302 sq. km, of which rainfall of the district is 1403 mm. Major part of the area belongs to hilly topography. The Forests of **Mohana** area of Gajapati district are rich in medicinal plants. This area is the survey point of my article.




Sampling techniques and data collection: Field studies are conducted to collect the primary data and information on medicinal plants found in the study site. During the field work, we followed the method adopted by Jain (1971,1981 and 1991). During the survey, depending on the convenience of the practitioners, guided field work method (Martin ,1995) is followed. A walk through the field where the medicinal plants are found and the houses where the medicine is prepared are also visited. This is done for confirmation of the data collected earlier. The data is recorded in the field note book and later it is analysed properly along with the experts. Various Phytochemicals released from different parts of herbs are documented using Indian Medicinal Plants [C .P. Khare (Ed.)] .






TABULATION - 1




| SL NO. | BOTANICAL NAME | PICTURE | LOCAL NAME | FAMILY | M/D | PARTS TO BE USED | DISEASES/USES | PHYTO-CHEMICALS FOUND IN THE PLANT |
|--------|-------------------------------|--|------------|-----------------|-----|--|--|--|
| 1 | <i>Achyranthus aspera</i> L. |  | ଅପମାରୀଚ | Amarantha-ceae | D | Leaves – juice Stem – brush Seeds – powder mixed with rice water | <ul style="list-style-type: none"> • Increase strength of teeth • For cleaning tooth • Cure piles | Achyranthine |
| 2 | <i>Allium cepa</i> L. |  | ପିଆଜ | Amaryllida-ceae | M | Bulbil – extract Bulbil – eaten uncooked Leaves – taken orally | <ul style="list-style-type: none"> • improves scar colour and eases pain and swelling • helps in reducing blood sugar • helps in treating stomach problems, prevents arteriosclerosis | Organosulphur compounds, Phenolic compounds, polysaccharides |
| 3 | <i>Aloe vera</i> (L.)Burm. f. |  | ଇଅକୁଆଁରୀ | Asphodala-ceae | M | Leaf – juice Leaf – juice | <ul style="list-style-type: none"> • Removal of acne and blackheads • Cures stomach problems such as stomachache | Anthraquinones , Chromones, Anthrones |




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|---|--|---|----------|---------------------|---|---|---|--|
| 4 | <i>Andrographis peniculata</i> (Burm.f.) Nees |  | ଭୂଇଁନିମି | Acanthaceae | D | Whole plant – decoction Leaves – juice | <ul style="list-style-type: none"> • Relive from intestinal parasites • Relief from fever | Decusatin, Mangiferin, Xanthones |
| 5 | <i>Argemone mexicana</i> L. |  | ଓଡ଼ଶମାରି | Papaveraceae | D | Whole plant – juice Latex – applied directly | <ul style="list-style-type: none"> • Used for ringworms • Heal the wound and Antidote for snake poisoning. | Dehydrocorydal-mine, Columbamine, Oxyberberine |
| 6 | <i>Bacopa monnieri</i> (L.) pennell |  | ବ୍ରାହ୍ମୀ | Plantagina- ceae | D | Leaf and whole plant – powderd form | <ul style="list-style-type: none"> • Used for treating brain conditions like memory loss and Alzheimer’s disease. • Helps in reducing depression, anxiety and stress. | Cucurbitacin, Caffeic acid, Quercetin |
| 7 | <i>Canna indica</i> L. |  | କାନ୍ନା | Cannaceae | M | Root - decoction Leaves – paste Whole plant – paste | <ul style="list-style-type: none"> • used for gonorrhoea and amenorrhoea • used for malaria • used to treat tonsillitis | Swietenine, Typhasterols, Hexacosanedioic acid |




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|----|---------------------------------------|--|----------|-------------|---|---|---|---|
| 8 | <i>Catharanthus roseus</i> (L.) G.Don |  | ସଦାକାହାର | Apocynaceae | D | Leaves – juice Root – paste | <ul style="list-style-type: none"> • Cures diabetes • Used in treatment of menstrual problems | Catharanthine, Vinblastine |
| 9 | <i>Chrysopogon zizanioides</i> |  | ବେଶାଜେର | Poaceae | M | Root - extract Whole plant – extract Leaf – paste | <ul style="list-style-type: none"> • Headache and toothache • Used to treat fever and skin diseases • Relieve form rheumatism pain, lumbago and sprain | Ascorbic acid Kusenic acid |
| 10 | <i>Clitoria ternatea</i> |  | ଅପରାଜିତା | Fabaceae | D | Leaves – warm paste with water Roots – paste | <ul style="list-style-type: none"> • For treatment of swelling • For treatment of Goitre and Odema | Kaempferol, Quercetin, Myricetin, Anthocyanin |





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|----|------------------------------|--|----------|----------------|---|--|--|---|
| 11 | <i>Coriandrum sativum</i> L. |  | ଧନିଆ | Apiaceae | D | Leaves – consumed as a tea with other Leaves – paste | <ul style="list-style-type: none"> • Treatment of constipation • Treatment of irritable bowel syndrome | Polyphenols, vitamins, phytosterols, |
| 12 | <i>Cuscuta reflexa</i> Roxb. |  | ନିର୍ମୂଳୀ | Convolvulaceae | D | Whole plant – paste Whole plant – decoction Whole plant – paste mix with til oil | <ul style="list-style-type: none"> • used in skin disease (external) • helps in clearing intestinal worms • solve hair fall | Cuscutine, Amarbelins, beta Sterols. Stigma sterols |
| 13 | <i>Cynodon dactylon</i> |  | ବୁବଘାସ | Poaceae | M | Leaf blades – juice mixed with honey Whole plant – powder | <ul style="list-style-type: none"> • Solves nasal bleeding • Used for pyria | Triterpenoids, resins, phytosterols, volatile oils |





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|----|--------------------------------|--|-----------|---------------------|---|--|---|--|
| 14 | <i>Dolichos biflorus</i> Linn. |  | କୋଳଡ଼ୁଆ | Fabaceae | D | Seed – powder Seed – taken in diet Seed – powdered, burnt and smoked | <ul style="list-style-type: none"> • Useful for melting kidney stones • To regulate menstrual cycle • Recommended for asthma, urinary discharge and hiccup | Tannin, Saponins |
| 15 | <i>Euphorbia hirta</i> L. |  | ଆସ୍ତମାଗଛ | Euphorbia- ceae | D | Roots – paste Leaves – extract Dried whole plant | <ul style="list-style-type: none"> • Useful for snake bites • Used for treatment of gastro intestinal disorders and bronchial disorders such as asthma • Used to treat skin diseases | Cardic glycosides, Anthraquinones, Steroids |
| 16 | <i>Evolvulus nummularius</i> |  | ବିଛାମୂଳିଆ | Convolvula- ceae | D | Seed and flower | <ul style="list-style-type: none"> • Used as an anthelmintic • To treat scorpion stings • Treats fever, wounds and burns | Cardinolides, Anthraquinones, Phenolic compounds |

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|----|------------------------------------|--|----------|--------------|---|--|--|--------------------------------------|
| 17 | <i>Foeniculum vulgare</i> Mill. |  | ଫାଳମହୁରୀ | Apiaceae | D | Seed - oil Seed - tea with other herbs | <ul style="list-style-type: none"> • Relive colic in infants • Treatment of colitis (swelling of colon) | Coumarins, Sterols, Felchone |
| 18 | <i>Kalanchoe pinnata</i> |  | ଅମରପୋଇ | Crassulaceae | D | Leaf- juice Leaf - juice mixed with black pepper Leaf - powder mixed with black pepper | <ul style="list-style-type: none"> • Useful in cholera • useful in blood oozing piles and haemorrhoids. • useful in inflammation, burning in urination and blocked urination and leprosy. | Fumaric acid, Kaemphferol, Quercetin |
| 19 | <i>Lippia alba</i> (Mill.) N.E.Brs |  | ନାଗବୈରୀ | Verbanaceae | D | Leaves - paste Leaves - decoction Leaves - syrup | <ul style="list-style-type: none"> • For wound healing • For treating stomachache, Diarrhea, nausea • To treat bronchitis, cough and cold | Phenol, saponins, gums |

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|----|--------------------------------|--|------------------|--------------|---|---|---|--|
| 20 | <i>Marsilea quadrifolia</i> L. |  | ସୁନ୍ଦୁସୁନ୍ଦିଆଶାଗ | Marsileaceae | D | Leaves- juice (or) paste (or) regular consumption Entire fresh plant – juice with garlic | <ul style="list-style-type: none"> relieves of hypertension, sleep disorders and headache Cure cough as well as convulsive condition of leg and muscles | Tannins, Saponins, Flavonoids, Steroids, |
| 21 | <i>Mentha spicata</i> L. |  | ପୁଚିନା | Lamiaceae | D | Leaves –fresh or dried Leaves - paste | <ul style="list-style-type: none"> Helps in treating sore throat, cold, inflammation of respiratory tract Helps in easing breast feeding pain | Carvone, Limonene, 1,8-cineole, Flavonoids |
| 22 | <i>Mimosa pudica</i> L. |  | ଲାଜକୁଳି | Fabaceae | D | Root – decoction with water Root – extract Whole plant – methnanolic extract | <ul style="list-style-type: none"> Used to treat toothache Used to treat bleeding piles, amoebic dysentery and diarrhea Wound healing properties | Mimosine and turgorin |

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|----|------------------------------------|--|----------|------------|---|--|--|--|
| 23 | <i>Ocimum sanctum</i> L. |  | ତୁଳସୀ | Lamiaceae | D | <p>Leaf - juice mixed with honey</p> <p>Leaf - juice mixed with black pepper</p> <p>Leaf - juice mixed with water or honey</p> | <ul style="list-style-type: none"> • Relief from cold and cough • Relief form fever • Helps in dissolving kidney stones | Eugenol, Rosmarinic acid , Apigenin, Myretenal |
| 24 | <i>Paederia foetida</i> L. |  | ପଶାକୁଣୀ | Rubiaceae | D | <p>Leaves - decoction</p> <p>Leaves - boiled & mashed</p> <p>Whole plant - decoction</p> | <ul style="list-style-type: none"> • decoction soaked cloths applied on the forehead and taken internally • used to treat urinary retention • used for abdominal pain, abscesses, arthritis | Iridoids, Palmitic acid, Ceryl alcohol |
| 25 | <i>Parthenium hysterophorus</i> L. |  | ବଣଗଞ୍ଜେଇ | Asteraceae | D | <p>Stem - soaked in water</p> <p>Leaves - decoction</p> | <ul style="list-style-type: none"> • Used to relive toothache, strengthen gums • To treat fever, diarrhea, neurological diseases, urinary tract infections, malaria | Metronidazole, Parthenin, Coronopilin |

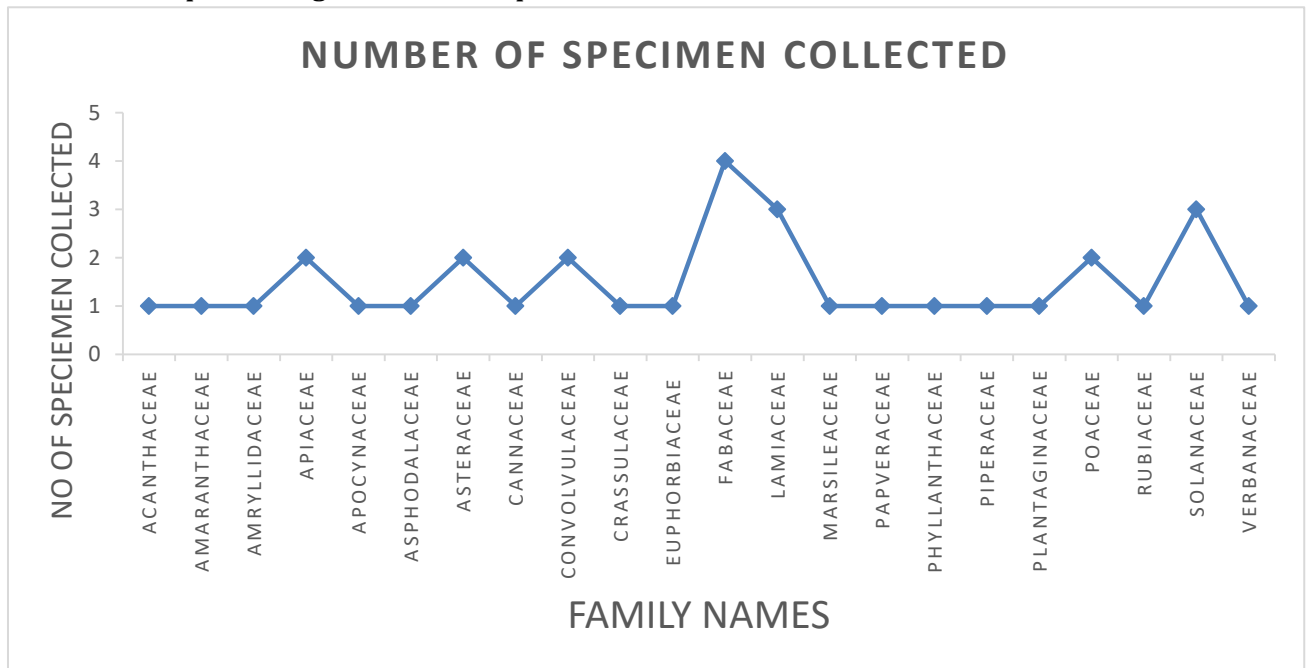
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|----|--------------------------------|--|----------|---------------------|---|--|---|--|
| 26 | <i>Phyllanthus niruri</i> L. |  | ଭୂଇଁଅଁଳା | Phyllantha- ceae | D | Leaves – paste mixed with turmeric Leaves – paste mixed with castor oil | <ul style="list-style-type: none"> • Solves skin problem • Helps in wound healing | Lignans , polyphenols, coumarins |
| 27 | <i>Physalis angulata</i> L. |  | ବିପାଳ | Solanaceae | D | Leaves – paste Whole plant – decoction | <ul style="list-style-type: none"> • For healing of wounds for anti inflammatory properties • For treating malaria | Physalins |
| 28 | <i>Piper longum</i> L. |  | ପିପ୍ପଳୀ | Pipearaceae | D | Fruit – powder mixed with honey Fruit – decoction | <ul style="list-style-type: none"> • Cures cold and cough • Treats fever | Piperine and piperettine |
| 29 | <i>Solanum lycopersicum</i> L. |  | ଟମାଟ | Solanaceae | D | Fruit | <ul style="list-style-type: none"> • Regulate blood pressure • Anticarcinogenic property against cervical cancers | Lycopin, Beta carotene, Phytoenes, Flavanones |

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|----|--|--|-------------|------------|---|---|--|---|
| 30 | <i>Trachyspermum ammi</i> (L.) Spreng ex Turill |  | ଢୁଆଣି | Lamiaceae | D | Seeds – overnight soaked with water Seeds – soaked with warm water | <ul style="list-style-type: none"> • Helps in digestion and provides relief from stomachache. • Relief in cough and asthma | Essential oil like Thymol, Alkaloid, FlavonoIds |
| 31 | <i>Tridax procumbens</i> L. |  | ବିଶଲ୍ୟକରଣୀ | Asteraceae | D | Leaves - paste Dried whole plant | <ul style="list-style-type: none"> • Applied on the wound for wound healing • Ingested orally for Controlling hemorrhages, inflammation and jaundice | Alkaloid, Tannin, Coumarin, Saponin |
| 32 | <i>Trigonella foenum-graecum</i> L. |  | କଣ୍ଠୁରିମେଥି | Fabaceae | D | Leaves – with lemon and honey Seeds – dried | <ul style="list-style-type: none"> • Use to treat fever Cleanses lymphatic system • Used as a pessary to cervical cancer and helps in lactation | Trigonellines, Sapogenins, Vitexin |
| 33 | <i>Withania somnifera</i> (L.) Dunal |  | ଅଶ୍ୱଗନ୍ଧା | Solanaceae | D | Leaves – paste Whole plant – fine powder Whole plant - oil | <ul style="list-style-type: none"> • Reduces inflammation • Anti fungal and anti microbial for skin conditions • Useful in paralysis, epilepsy, sleeplessness | Withanine Withananine Withaferin |

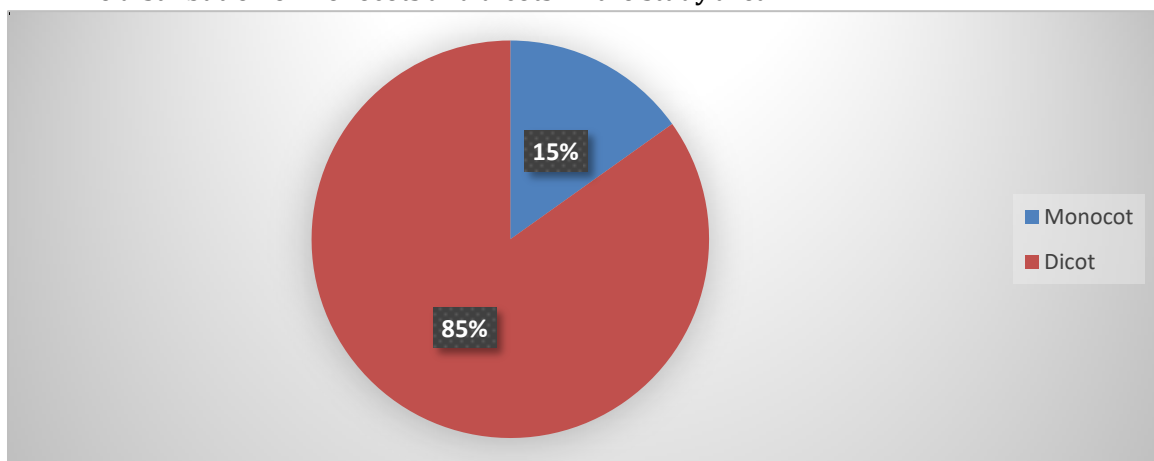
Results:

The present studies were carried out by collecting information about traditional uses medicinal plants by tribal population (57%) of Gajapati district. After confirming the identity, the plant species were referred to their respective families and arranged as per Bentham and Hooker’s System of classification. All the species have been arranged in alphabetical order of their botanical names in a tabular form along with their ethnobotanical uses. A total of 33 plant species belonging to 22 families have been identified and collected from the study area . The information collected during the surveys were arranged into a tabular form. These are some observations of Tabulation -1:

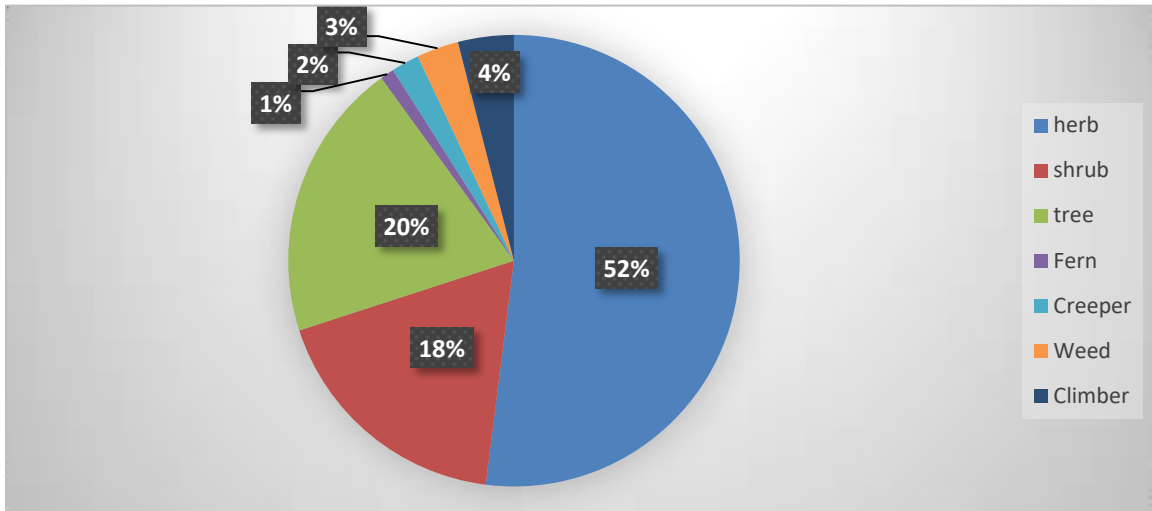
Graph showing distribution of plant families



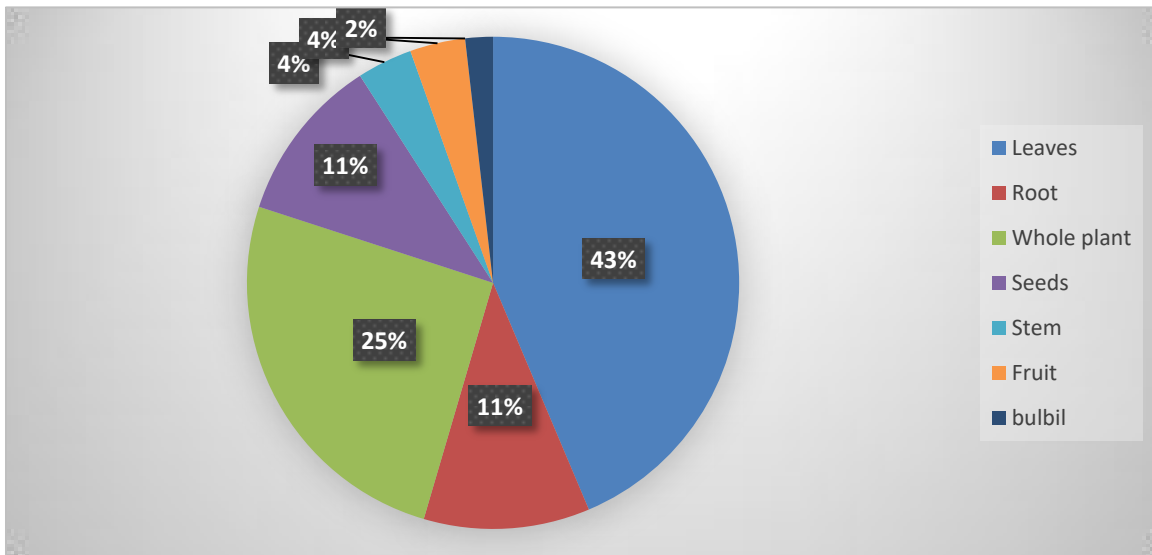
The distribution of monocots and dicots in the study area



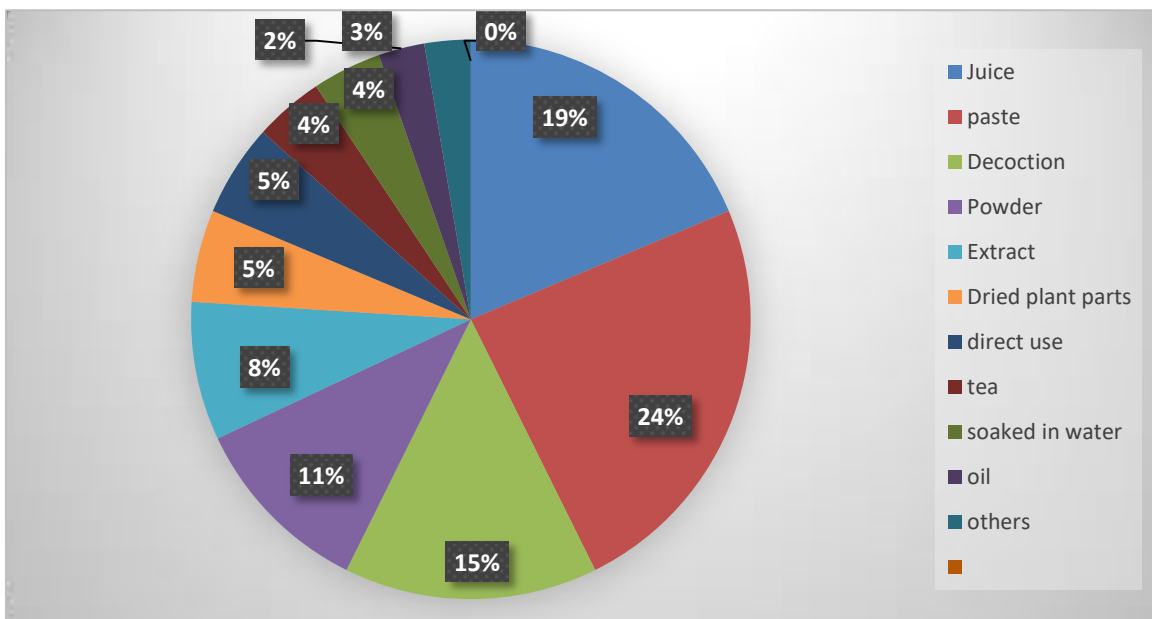
The distribution of habit in the study area



PARTS OF THE PLANT USED FOR MEDICINE PREPARATION



DISTRUBUTION OF DOSAGE TYPE



The major groups of phytochemicals are phytosterols, flavonoids terpenoids, saponins, alkaloids, carotenoids, aromatic acid, organic acid, essential oils and protease inhibitors. Survey revealed that certain plants produce specific phytochemical unique to it, like mimosine is Specific to *Mimosa pudica* L., Withanine, to *Withania somnifera* , Cuscutin to *Cuscuta reflexa* ,Cucurbitacin to *Bacopa monnieri*, Piperine and Piperettine to *Piper longum*, Achuranthine to *Achyranthus aspera*. Phytochemicals prominent to medicinal herbs are generally possesses antibacterial, anti-fungal, anti-carcinogenic, anti-inflammatory and anthelmintic properties.

Discussion:

There are 49 angiosperms belonging to 29 families and 45 genera having ethnomedicinal uses in skin diseases by the tribal people living in Nuapada district of Odisha were reported. (Dhal *et al.*, 2013).

Cassia fistula L. was studied against fungal infections and the study further emphasizes upon detailed analysis of the bioactive compounds in different plant parts and their possible use in preparation of medicines against skin diseases among the tribal (*Dongaria Kandha*) of Niyamgiri, Odisha (Kumar *et al.*, 2012).

Ethnomedicinal knowledge in the coastal regions of Uttara Kannada district of Central Western Ghats have provided the information about important plants in the treatment of different types of skin diseases (Bhat,2013).

About 50 plants species from the North West region of Ganjam district and their therapeutic information gathered where people rich in their old customs and culture and adopt herbal therapy for the treatment of majority of diseases because of strong belief on local practitioners (Leelaveni *et al.*, 2018).

Ethnobotanical uses of 107 plant species were reported from Mersin and Adana provinces of Turkey which were used especially for intestinal digestive disorders of the gastrointestinal tract, respiratory tract system disorders, heart-blood circulatory system disorders, urinary tract system disorders and skin disorders (Everest and Ozturk, 2005). Ethnobotanical studies can further lead to scientific assessment of the traditional medicines used which may provide a lead in drug development (Rout *et al.*, 2009)

Conclusion:

India is a land of faith and belief. Although, as a developing country our medical science has been improving lately, people from the remote areas still prefer the traditional medicine due to their poor socio-economic condition. A total of 33 Species belonging to 22 families are collected from the study area. These are Acanthaceae, Amaranthaceae, Amaryllidaceae, Apocynaceae, Asphodalaceae, Cannaceae, Crassulaceae, Euphorbiaceae, Marsileaceae, Papaveraceae, Phyllanthaceae, Plantaginaceae, Rubiaceae and verbanaceae. Phytochemicals present in the medicinal herbs like flavonoids, polyphenols, alkaloid, tannins, coumarins etc. Along with these, some plant specific phytochemicals such as mimosine, withanine, Cuscutin, Cucurbitacin, Piperine, piperettine, Achuranthine The tribal folks of the remote woodlands are more healthier than city people. Reason behind it, is their "extensive knowledge of nature and it's healing properties. Herbal medicines are in great demand in the developed as well as in the developing countries for primary health care because of their wide biological and medicinal activities, higher safety margins and lesser costs. This area is full of potential. Our paper is just a starting point to further research and extensive studies in this feild

Acknowledgements:

We acknowledge the efforts of the village Vaidyas who have put hard labour to popularize the cost effective medicinal plants among villagers and who have shared their oral knowledge unhesitatingly with us to prepare the written record of this rare study.

2. Our acknowledgement is also due to the people of the Mohana locality who have whole heartedly helped us in collecting medicinal plants and herbs and narrated the efficacy of the medicines as tried and trusted methods, and who have come forward to share their practical healing experience of using these medicinal plants and herbs.

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