

## Study of Indigenous Medicinal Plants of Northeast States of India as Potential therapies for Malaria

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The urgent requirement to an alternative medicinal input led to research on indigenously used antimalarials plants in northeast states of India . An ethno botanical survey of potent antimalarial plants used by different tribes and communities of the northeast state of India is the main purpose of the research. The different methods used for the present research includes personal discussion, group interviews with traditional practitioners. Ethno botanical information of various anti-malarial plant's parts used and mode of administration of the plant extracts were documented . For the present research, different types of secondary materials such as journals, research papers and e-books of various institutes and universities of northeast India was gathered for knowledge on medicinal plant treatment for malaria. The results of the research was that the people belonging to the north eastern region of India commonly use Forty-eight species of plants from different species of 26 families for the treatment of malaria. All the 48 medicinal species of plants were found either in their local area where they used to live or in the nearby forest area. Some of the most commonly used plants used for the treatment are as follows: leaves (38%), roots (33%), bark (14%), whole plant (07%) Based on the research conducted it was further concluded that Malaria can be treated by utilising herbal drugs which are already utilised by conventional Practitioner and Tribes staying and belonging to India .

**Keywords:** Ethnobotany, Malaria, *Plasmodium vivax*, Herbal drugs & Herbal Treatment.

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Single-celled protozoan parasites named Plasmodium are the cause of Malaria and it is through the Anopheles mosquito that it is transmitted to man. It is recognised as one of the most important diseases globally, which is considered fatal, more so in the tropics, to add to it. It is endemic in about 102 nations worldwide, which is approximately more than 50 % of total population of the world. They are all at risk experiencing high death rates of which children belonging to less than five years are part of (Smyth and Walkelin , 1994). Estimated by WHO there are every year about 300 to 500 new cases of malaria

is recorded, every year, majorly in places like South America, Africa and the islands of south Pacific which contributes to at least 10 lakhs deaths annually. Despite the management programs in many countries, there has been negligible development in the management of malaria. The infections can be the cause of reduced effectiveness of work and can lead to losses, both financial and human. Controlling malaria is complicated as drug resistant strains of Plasmodium keeps appearing and with the detection that man becomes infested with species of simian (monkey) malaria (Smyth and Walkelin , 1994). It is to be noted that the

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Anopheles mosquitoes have attained confrontation to many insecticides (Srisilam and Veersha, 2003). Human Malaria is a fatal disease. It is transmitted through the bite of *Anopheles sinensis* an infected female mosquito. Most of the time one of four species of the genus Plasmodium namely: *P. falciparum*, *P. vivax*, *P. ovale*, *P. malariae* causes this disease.

#### **Epidemiology of Malaria**

In seven states of India belonging to the north eastern region namely, Tripura, Mizoram, Assam, Meghalaya, Nagaland and Arunachal Pradesh the spatial distribution data of *P. vivax* were examined retrospectively between the years 2008 till 2013 (Sharma et al., 2015). Moreover, cross-sectional surveys of malaria were organised and executed during 1991-2012 in malaria endemic spots across the States of Assam, Arunachal Pradesh, Mizoram, Nagaland, Meghalaya and Tripura to account for the occurrence of *P. vivax* across diverse age groups (Sharma et al., 2015). In all north-eastern States vivax malaria prevailed but there was seen a clear separation of two malaria ecotypes following  $d < 30$  and  $> 30$  per cent of the total cases of malaria (Sharma et al., 2015).

*P. vivax* cases ranging from 60–80% was noted in high proportions in Nagaland and Arunachal Pradesh in the north having an environment which is alpine, 42-67 per cent in the state of Manipur, however it ranged from 23- 31 per cent in Assam with tropical cum sub tropical climate (Sharma et al., 2015). The least percentage of *P. vivax* cases were found in Meghalaya, Tripura and Mizoram. All age groups showed the occurrence of malaria cases but a maximum percentage of *P. vivax* consistently occurred among  $< 5$  yr age group compared to *P. falciparum* ( $P < 0.05$ ). It was throughout the year that *P. vivax* cases were recorded with the highest record coinciding with rainy season, however, the intensity of transmission and duration varied (Sharma et al., 2015).

#### **Allopathic Medicine in the treatment of uncomplicated malaria**

The most commonly used medicine to treat malaria by the physician is chloroquine. It is found that *P. ovale*, *P. vivax* and *P. malariae* are usually responsive to this drug but in some strains of *P. vivax* there is an increasing resistance.

#### **Herbal Plants in the therapy of Malaria**

It is a well-known fact that humans have been using plants as a source of medicine since ancient times. There was a time when almost all medicines were derived from biological resources. In fact, plants and plant based medicines form the basis of many modern pharmaceuticals even today for a number of ailments. The two most common drugs used to treat malaria are quinine and artemisinin isolated from Cinchona and Artemisia plants respectively.

#### **Aims & Objective**

1. To discuss the disease malaria and its causative organism.
2. To collect, elaborate and discuss the treatment of malaria by Traditional medicine which was practiced by various Tribal communities in north east states of India.
3. To discuss with local residents, traditional practitioners and export from the same field.
4. To discuss the practical usage of folk herbs in treating malaria.

### **MATERIALS AND METHODS**

#### **Study area**

The investigation areas picked by the researcher are northeast states (Sikkim, Assam, Arunachal Pradesh, Mizoram, Manipur and Nagaland) of India. It is a known fact that the above mentioned states are mostly high mountainous territories of which two thirds of the area is mostly covered with mountains and hills having high terrains of height of more than 50 m lying between the valley of Brahmaputra which is above 7000 m in the borders of Himalaya (Sarma et al., 2019). The states lie between  $22^{\circ}00'2$  to  $29^{\circ}30'2$  N and  $89^{\circ}40'2$  to  $97^{\circ}25'2$  E, and occupy an area of 255,128 Km<sup>2</sup> (Sarma et al., 2019). The total northeast states share its International borders of 4600 km with Bhutan (on West), Bangladesh (on South), Myanmar (on East) and China (on North) (Sarma et al., 2019). Tropical monsoon humid climates prevail over the north-eastern states (Sarma et al., 2019). The regular temperature throughout winter season ranges between 16 to 20 and 30 °C during summer. The valleys and the mountainous region show an important climatic dissimilarity between them. The northeast region receives extremely

heavy-to-heavy rain during June to September which is the South -West Monsoon season, and the region receives maximum rain in the month of June (Sarma et al., 2019). The yearly rainfall is 2000 mm which is also the average rainfall with local differences (1500 to 12,000 mm) (Sarma et al., 2019). More than 50 % , the geological area of all north-east states is afforest excluding Assam. The north east also forms one of the two biodiversity hotspots in India. 45,161,611 is the overall population of the given area (2011 census) and it is not homogeneously distributed (Sarma et al., 2019). The northeast states are densely populated with plains of Brahmaputra, Barak river in Assam, the Imphal plain in Manipur and the Western part of Tripura (Sarma et al., 2019).

The gateway to NE is Assam in India because it joins the Northeast region to the Indian Mainland by 22 km narrow piece known as the “ Chicken Neck “ (Sarma et al., 2019).

#### **Ethnobotanical survey**

The researchers have used their techniques to gather information , same as used by (Asase *et al.*, 2005) in their research about the antimalarial plants in the investigation area .

#### **Field interviews**

The researcher walked with the local inhabitant in the area where they generally collect their known antimalarial plants and interviewed them . After identifying one plant used to cure malaria by locals people , they consulted among themselves the antimalarial properties of the plant . The three to five local inhabitants involved in this study were suggested by the management of Botanical Garden , Howrah , West Bengal as having the maximum information about the use of medicinal plants in the area

#### **Door -to- Door interviews**

For the research , researchers interviewed 21 people by using a questionnaire prepared by them . Researcher took the assistance of a local trained guide for interpretation during the interview. The questionnaire was prepared with the view of getting all information regarding the plants species , method of medicine preparation , prescription and administration of the medicine .

#### **Interviews with Traditional Practitioners**

Seven herbalists were identified with the help of local resource authority . The researcher arranged for them to collect plants they use in

the treatment of material . After collection the herbalists were interviewed about how they use these plants .

The primary data collected for the present research includes the books, journals, article, e books which have been written and published by the Universities and other institutions belonging to the north eastern region in India. The information has been collected on botanical therapies and other plant species which have been used for the treatment of malaria. The local conservative and conventional practitioners were interviewed after proper confirmation and validation from them. The references and other data related to plants which were used in the present research have been properly placed in the pattern and the botanical name and division were also re analysed and were confirmed with the flora of India. For the purpose for the present study, researchers have interacted with the traditional practitioners with the help of interviews and other ways of communication in the communities residing and staying the states in the north-eastern regions in India

#### **Duration Of Research**

The researchers took a total of twenty (25) months to complete the survey work. The researchers stated the survey by the 1<sup>st</sup> week of July, 2017 and ended it by the last week of August, 2019.

## **RESULT AND DISCUSSION**

A total of 48 species belonging to 26 families were identified during the ethnobotanical survey as being used in the treatment of malaria. A complete data regarding scientific name of medicinal plants, botanical families name, local name and parts of plants used are given in table no. 01 . The traditional healer or vaids used leaves, roots, bark, stem, rhizome, seeds and sometimes whole plant as antimalarial medicine. Above mentioned parts of plants Leaves , roots and bark are most utilised as antimalarial medicine by the traditional practitioners or vaids .

The researcher worked on a total of 26 families named as Apocynaceae (2) , Acanthaceae (2) , Asteraceae (3) , Berberidaceae (1) ,Betulaceae (1) , Boraginaceae (1) , Brassicaceae (1) , Caricaceae (1) , Euphobiaceae (2) , Fabaceae (1) , Gentianaceae (3) , Lamiaceae (2) , Lauraceae (1) , Malvaceae

## List of Antimalarial Medicinal Plants

Sl. No	Plant's Name	Family	Vernacular name	Parts used	How to use	Reference
1	<i>Alstonia scholaris</i> . R.Br	Apocynaceae	Tun tong in Khamti language	Bark	Bark infusion is given once a day	(Baruah et al., 2013; Purkayastha et al., 2007 ; Shankar & Rawat , 2008 ). (Das and Tag, 2006)
2	<i>Andrographis paniculata</i> Wall . Ex Nees	Acanthaceae	Gokur in Bengali language	Leaf	First crushed the leaves and taken it with 120 mil of milk for 2-3 days	(Mahanti et al., 1994)
3	<i>Artemisia nilagirica</i> ( C.B. Clarke ) Pamp.	Asteraceae	Nagдона in Assamese language	Leaf	Decoction of leaves is given	(Mahanti et al., 1994)
4	<i>Berberis aristata</i> DC	Berberidaceae	Druhaldi in Bengali language	Root	Extract of Root used as Tonic	(Biswas et al., 1982 )
5	<i>Betula alanooides</i> Buch. -Ham	Betulaceae	Bhujpatra in Hindi language	Bark	Decoction of bark is given	(Shankar et al. , 1996 )
6	<i>Carica papaya</i> L.	Caricaceae	Papeya in Bengali language	Leaf	Used as vegetable	(Sharma, U. K., 2004)
7	<i>Cinchona officinalis</i> Linn. f.	Rubiaceae		Bark	First convert the bark into powder and then boiled the same with water and give it to patient.	(Pandey & Issar, 1991)
8	<i>Cinnamomum bejolghota</i> ( Buch. -Hum	Lauraceae	Tezpta in Mi language	Bark & Leaf	First of all taken the laves of <i>Anacolosa crassipes</i> and boiled it with leaves & bark of <i>Cinnamomum bejolghota</i> . Now this water need to be taken as steam , orally and finally taking bath with same.	(Rai and Lalramnghinglova, 2010)
9	<i>Cissampelos pareira</i> L.	Menisper- maceae	Tubuki lot in Assamese language	Root	Extract of Root utilise as Tonic	(Sharma, U. K., 2004)
10	<i>Citrus medica</i> L.	Rutaceae	Baranimbu in Bengali language	Fruit	Fruit's juice is utilise as medicine	(Sharma, U. K., 2004)
11	<i>Citrus sinensis</i> (L). Osbeck	Rutaceae	Kamala nimbu in Hindi language	Leaf	Decoction of leaf is given as medicine	(Kumar, 2002)
12	<i>Clausena excavata</i> Burm .f.	Rutaceae	Bhant in Hindi language	Leaf	Apply the Juice on muscular pain area to alleviate pain	(Sikdar, 2008)
13	<i>Clerodendron infortunatum</i>	Verbenaceae	in Assamese language	Bark & Leaf	Decoction is given	(Kohli, 2003)
14	<i>Clerodendron colebrookoianum</i> Walp.	Verbenaceae	Nephaphu in Assamese language	Leaf	Decoction is given	(Sikdar, 2008)
15	<i>Coptis teeta</i> Wall	Ranuncula- ceae	Mishmi teeta in Assamese language	Root & Rhizome	A oral dose of 150 gm need to be given thrice a day	(Shankar et al., 2007; Sikdar, 2008); Yonggam, 2005)
16	<i>Crotolaria occulta</i> Grab	Fabaceae		Plant	Prepare the juice of plant with warm water and given it to patient.	(Shankar et al., 2007; Sikdar, 2008)
17	<i>Croton tigilium</i> L.	Euphorbi- aceae	Jaiphall in Hindi language	Leaf & flower	Prepare the power by the plant and consume it with 200 mil of water till cured	(Das and Tag, 2006)
18	<i>Croton caudate</i> Geisel	Euphorbi- aceae	Assamese language	Root	Decoction of root is given	(Sharma, U. K., 2004)
19	<i>Cynoglossum glochidion</i> Wall.	Boraginaceae	Monpa in Assamese	Root	Prepare the power by the root and mixed	10 gm is taken (Shankar et al.,

			language		with water. two times a daily	2007 )
20	Datura metel L.	Solanaceae	Dhatura in Hindi language	Seed, Leaf & Root	Given in fever with catarrhal and cerebral complication	(Mahanti et al., 1994)
21	Dichroa febrifuga Laur	Saxifragaceae	Basak in Hindi language	Root & Leaf	Tips of roots and leaf are taken out and used in Malarial fever	(Mahanti et al., 1994).
22	Halenia elliptica D Don	Gentianaceae	Qing ye dan (Mon)	Plant	Administered orally in malarial fever	(Shankar et al., 2007)
23	Hedyotis scandens Roxb.	Rubiaceae	Bakrelara in Nepali language	Root & Leaf	Mixing of Roots and Leaves are taken as an effective treatment	(Rai and Lalramnghinglova, 2010)
24	Helianthus annus L	Asteraceae	Surajmukhi in Hindi language	Leaf & Flower	Decoction of leaf and Flower parts are taken with honey in prescribed way	(Sharma, U. K., 2004 ; Sinha, 1996 )
25	Impatiens angustifolia BlumeL.	Balsaminaceae		Leaf	Paste is given	(Sikdar, 2008)
26	Lantana camara L.	Verbenaceae	Hlingpangpur in Manipuri language		Decoction of plant is given as medicine	(Rai and Lalramnghinglova, 2010)
27	Meliodinus monogynus Roxb.	Apocynaceae		Leaf, wood & root	Contain a narcotic poison and used as antimalarial drug	(Mahanti et al., 1994)
28	Mesona Wallichiana Benth	Lamiaceae		Root	Make a extract with Boiled water and given as medicine	(Singh , S.K. 2005)
29	Nosturtium officinale Br.	Brassicaceae		Plant	Decoction of plant, taken ( 2- 3 tea spoon ) twice day	(Shankar et al., 2007)
30	Ocimum sanctum L.	Lamiaceae	Tulsi in Hindi Language	Root	Decoction of plant is given as diaphoretic	(Das and Tag, 2006)
31	Passiflora nepalensis Walp.	Passifloraceae	Nauawimu in Manupuri	Root	Decoction of plant is given as medicine	(Kumar, 2002)
32	Piper mullesua Buch .Ham	Piperaceae	Damdawi in Manipuri	Leaf & Fruit	Make the plant dry under sunlight and administered during , malarial fever , cold and cough	(Das and Tag, 2006); Pandey & Issar , 1991)
33	Randia faciculata Roxb. (DC)	Rosaceae	Pulikaint in Assamese language	Leaf	Leaf of this pant mixed with Piper nigrum and make a boiled extract of same and given it to patient	(Kohli , 2003)
34	Rubus ellipticus Sm. Rubus	Rosaceae	Hmu tau in Assamese language	Leaf	Decoction of Root is utilised as medicine	(Purkayastha, Dutta and Nath, 2007)
35	Satyrium nepalense D Don	Orchidaceae		Tuber	Administered as potion	(Sikdar, 2008)
36	Sida rhambifolia L.	Malvaceae	Borials in Assamese language	Root	Boiled extracts is given	(Purkayastha, Dutta and Nath, 2007)
37	Solanum varium Cl.	Solanaceae	Thitbyake	Root	Root's decoction is used as medicine	(Shankar et al., 2007)
38	Solanum torvum Sw.	Solanaceae	Pura begum	Fruit	Overcooked fruit are given as medicine	(Das and Tag, 2006 ; Sharma, U. K., 2004)
39	Stephania japonica Miers	Menispermaceae	Rajpatha in Hindi Language	Tuber	Dried under Sun and changed to powder and taken same with water two times a day for till malaria is cured.	(Das and Tag, 2006)
40	Strobilanthes auriculatus	Acanthaceae	Ram in Assamese Language	Leaf	Crushed leaves apply on the body during the cold stage of intermitted fever	(Mahanti, N. , 1994)
41	Swertia dilatata Wall.	Gentianaceae	Sir hota in Assamese Language	Root	Powdered root is consumed orally	(Sikdar, 2008)
42	Swertia nervosa	Gentianaceae	Sir hota in	Plant	Decoction of whole	(Sikdar,

43	Wall . Taraxacum officinalis Wigg.	Asteraceae	Assamese Language Dudal in Hindi Language	Plant	plant is used Powdered of plants parts is administered as medicine	(2008) (Sikdar, 2008)
44	Thalictrum foliolosum L	Ranunculaceae	Pilijari in Hindi Language	Rhizome & Roots	Extract is used as tonic	(Shankar et al., 2007)
45	Vandellia sessiliflora Benth.	Scrophulariaceae		Plants	Decoction of whole plant is utilised	(Shankar et al., 2007)
46	Vitex peduncularis Wall	Verbanaceae	Thing- khawi -lu in Mizoram language	Bark, Leaf & Stem	The bark is crushed and boiled . The stem vapour is inhaled by malarial patient .	(Lalfakzuala et al., 2007 ; Shankar et al., 1996 )`
47	Picrorhiza kurrooa Benth .	Scrophulariaceae		Root	Crushed with water and consumed as medicine	(Biswas et al., 1982)
48	Zanthoxylum hamiltonianum Wall	Rutaceae		Root & Bark	Decoction of Root and Bark is utilised	(Shankar et al., 2012)

(1), Menispermaceae (2), Orchidaceae (1), Pasifloraceae (1), Piperaceae (1), Ranunculaceae (2), Rubiaceae (4) , Rosaceae (2) , Rutaceae (4), Saxifragraceae (1) , Scrophulariaceae (2) , Solanaceae (3) , Verbanaceae (5) . Among the above mentioned families Verbenaceae (5) , Rutaceae (4), Rubiaceae (4) , Asteraceae (3), Gentianaceae (3) , Solanaceae (3) are principal in respect of the number of species utilised to treatment of malaria.

During the survey, it is found that the five species of plants namely *Copys teeta* , *Alstonia Scholaris*, *Crotolaria occulta*, *Vitex peduncularis* and *Acimum sanctum* were used by at least one traditional practitioner from others parts of northeast in India. During the survey, it is also found that these four botanical families Apocynaceae , Fabaceae , Lamiaceae and Verbaceae are used by more than one traditional healer or vaid throughout the northeastern states in India .

This observation was important for further scientific validation of traditional knowledge and is an enduring aspect of ethnobotany in general.

The reported species that was used particularly for the treatment of the given sickness, malaria, were either available around he habitation where the people resided or the same was available in the forest area around the north eastern region. More than twenty scholars have reported that given plants having anti malarial properties and also the researcher himself reported of at least ten plants containing the anti malarial properties in the different regions of Arunachal Pradesh.

The traditional practitioners used different processes like decoction , infusion , maceration and mechanical crushing to extract the pharmacological agents from different plants The traditional practitioners or vaid prescribed different oral dose of extract according to patient conditions .

However, it was not possible to know how these medicinal practitioners or vaid estimated the therapeutic index of the prescribed antimalarial plant based formulations without causing any lethal consequence.

Most traditional practitioners acquired the knowledge about medicinal plants and its uses either by their ancestors or from other resources. During the survey it is found that only 60 % traditional practitioners or vaid are having certificates or done a specified course to practice his profession. Prior to prescription ,the traditional practitioners were found to enquire about some basic information such as age , gender , pre-medical history , symptom of the malaria , any pre-treatment , since how long he/she is suffering from it and alcoholic /non-alcoholic .

The plants that were scrutinised for the present research belonged to Manipur, Mizoram, Assam , Arunachal Pradesh and Tripura. The plants have been used as the traditional treatment of malaria and it would also cure the symptoms of the same. Most of the plants that have been used were in the form of decoctions and the some other plants have been used which were externally and internally available in the local regions. Shrubs and other herbs were also utilised in the treatment

of malaria however leaves is the most commonly utilised plants in the therapy of malaria.

The percentage for the treatment is as follows:

- Leaves is 38 percent
- Roots is 33 percent
- Whole plants is 07 percent

The great frequency of the use of leaves in the treatment is the traditional method is because of the easy availability of the leaves in the given area and also easy gathering of leaves for the treatment. The knowledge on treatment of malaria by plants in the north eastern regions is a combination of high level of relation which is found in the uses of the mentioned plants. It indicates that the inheritance

of the knowledge of our fore fathers is well known all across the countries.

It shows that sometimes when the alternative medium is available in remote areas for the treatment. Four species from the north-eastern regions were found to be present also as repellents of mosquitoes. The local people used them as an alternative for Dichlorodiphenyltrichloroethane and other pesticides too. It is a commonly well - known fact that Dichlorodiphenyltrichloroethane and other pesticides have great impact on human health and also to the environment at large.

Plants having the properties of antimalarial components such as alkaloids, sesquiterpenes,



Fig. 1. Image of political boundaries of seven northeast states

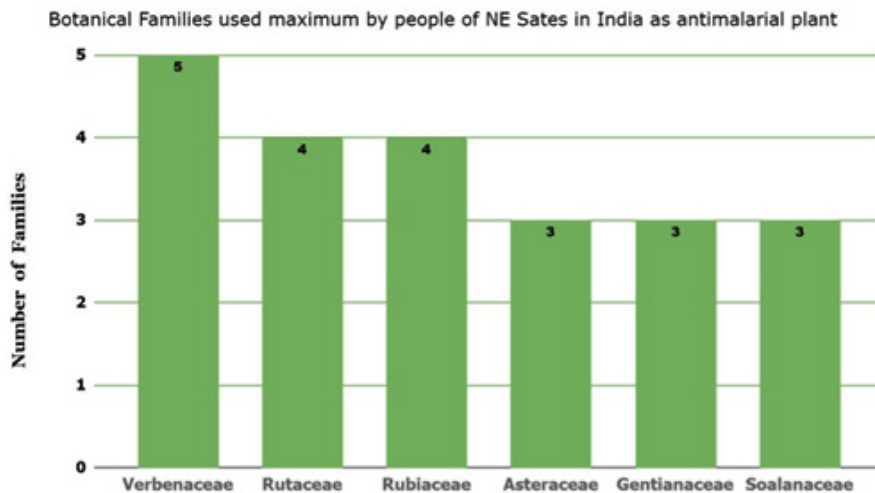


Fig. 2. Maximum used families of antimalarial medicinal plants used by traditional practitioners

quassinoids, flavonoids and triterpenoids can be extremely important sources. These compounds have very high, low and moderate in the antiparasitic actions while some of them remained inactive. They also have an important feature of extraction of crude and essential oils and also other chemical structure from the other plants. These are important properties, which are also anti microbial in nature.

The information gathered, there were also similar properties of the plants analysed such as, some plants showed increased potency when compared to other plants. There were also other plants that were employed for the proper symptoms of malaria such as fever, weakness, failure in the renal area and body pain. Most of the plants that have been taken into consideration have lacked actions against malaria because of the absence of an important aspect *in vitro* activity against the Plasmodium. Some of the scholars have however underestimated the conventional plants and their uses for the treatment of malaria and it is specifically based on low activity against the Plasmodium in animal models and *in vitro* actions. This makes the methodology or the strategy slightly erroneous.

#### Significance in Today's Era

It was back in 900 BC when Indian Ayurveda ( Science and knowledge of life ) was discovered and used (Ebbell, 1937) . Prior to the advent of iatrochemistry in the 16th century ,

plants were the primary source of treatment and prophylaxis (Kelly , 2009) . The beginning of the medicinal plant's use was instinctive, as is the case similar to animals (Stojanoski, 1999).

The widespread use of medicinal plants is not restricted to India or other developing countries. Other countries such as Canada and Germany have been using the herbal medicine regularly to treat medical problems in the patients such as diabetes and high levels of cholesterol. Thus, it can be said that there is an exponential increase in the use of medicinal plants in the present times. With the relaxation of the rules regarding the use of medicinal plants in certain countries all over the world, the market of medicinal plants has boomed. Over the last couple of years, a very curious thing has happened, instead of losing popularity over medical science and pharmaceutical industry, the medicinal herbs and plants have boomed as because have understood the importance of the same. One very important reason as to why medicinal plants have obtained popularity in the present era as well as in the years to come is because of its inability to cause any side effects which the pharmaceutical drugs have the likelihood of causing. With the increased awareness amongst people about health issues, concerns have been raised continuously and that is why people opt for a more healthy and natural way for curing their illness. There is however no doubt those herbal medicines have been found to have some type of impressive

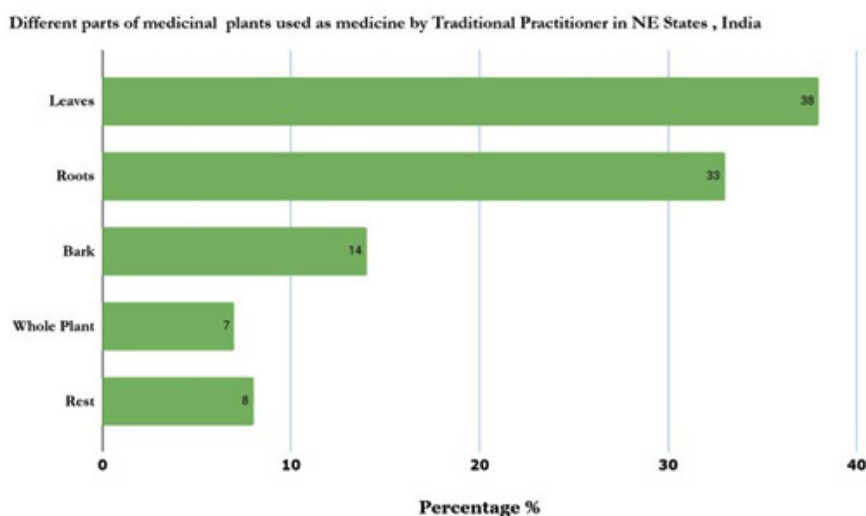


Fig. 3. Parts used as medicine along with their percentage



credentials. Another reason as to why medicinal plants shall be gaining more popularity in the years to come is their sure shot cure. This means that it is estimated that most of the patients who have been treated with the use of medicinal plants, the results are effective. For example, the use of penicillin which, replaced mercury in the treatment of syphilis has put to an end many deadly epidemics which came from plant mold. Belladonna continues to provide the chemical which can be used in the treatment of ophthalmological preparations and other antibiotics that can be used in the treatment of gastrointestinal problems.

The use of Indian snake root i.e. Rauwolfia serpentina contains, reserpine, which is an active ingredient that can be used for the treatment of many emotional and mental problems too. However, reserpine is hardly used in the present times the discovery of the same was a remarkable invention in the field of medicinal plants. Thus, in the coming years as well as in the present era the use and importance of medicinal plants is growing and there is an upsurge in the use of the same in most of the medical issues. However, before medicinal plants is used as a mainstream medicine, it is important that some of its problems gets solved. To attain a stage where the medicinal plants gives best quality and effective treatment it should in the first place become integrated to the mainline treatment and also overcomes the obstacles which may come in the near future. The present practicing health care professionals do not learn about phytomedicines nor do they hold programs to spread about its awareness. The main problem that should be solved before the herbal medicines join mainstream is to improve the quality of information which is available about them in the form of literature review, journals and articles. With misinformation which can be easily spread because of internet, it becomes very important to make sure that the information which is passed on is highly filtered. Thus, the efficacy, safety and regulations in pursuit of medicinal plants should be well written and well explained before it is available on a public platform. By ensuring these, one can become sure of the increase use of medicinal plants for curing diseases globally.

## CONCLUSION

Based on the above research work, it can be concluded that medicinal plants are powerful sustainable herbs, which are mostly beneficial to humankind. It is the different chemicals substance, which is lies inside the medicinal plants that produce a particular physiological action on the human body. Mostly chemical compounds which are present inside the medicinal plants are phenolic , alkaloids , flavonoids and tannins etc In India , Northeast states ( Tripura, Mizoram , Assam , Manipur , Meghalay , Nagaland and Arunacha Pradesh ) are under considered geographical location and possesses huge number of valuable medicinal plants . The current survey found a good number of medicinal plants in northeast states which have significant role in the treatment of Malaria.

During the survey, it is also realised that most of local people using the above mentioned medicinal plants for treatment of Malaria . However, the widespread use of the medicinal plants is not restricted to developing nations. The rebirth of the herbal medicines, which, has taken place in the developed countries, took place because of the revival of interests in the scientific information of plants. Herbal medicines are not only used for the treatment of Malaria but also for other chronic diseases. The trained physicians cannot ignore the use of herbal medicines. They should realize it that the large number of patients is using the herbal medicines. The disclosure from the patients using herbal medicines may redirect them to use medicinal plants for the treatment too. The patients and the physicians should enter into a discussion and should compare about the appropriateness of herbal medicines over the pharmaceutical drugs.

Patients who are suffering from chronic problem such as AIDS or cancer should be made aware of the benefits that are linked with the usage of medicinal plants for their treatment. The aim of the study was to find out the use of medicinal plants for treatment of malaria by the indigenous people who stay in the north east regions of India have been initiated and handful of plants have been found to cure Malaria. Thus, the aim of the present

research has been satisfied. Moreover, the research also deals with the importance or the significance of the study in the present era.

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