On the traditional medicinal plants and plant derived natural drugs used by indigenous people of Nagaland, India

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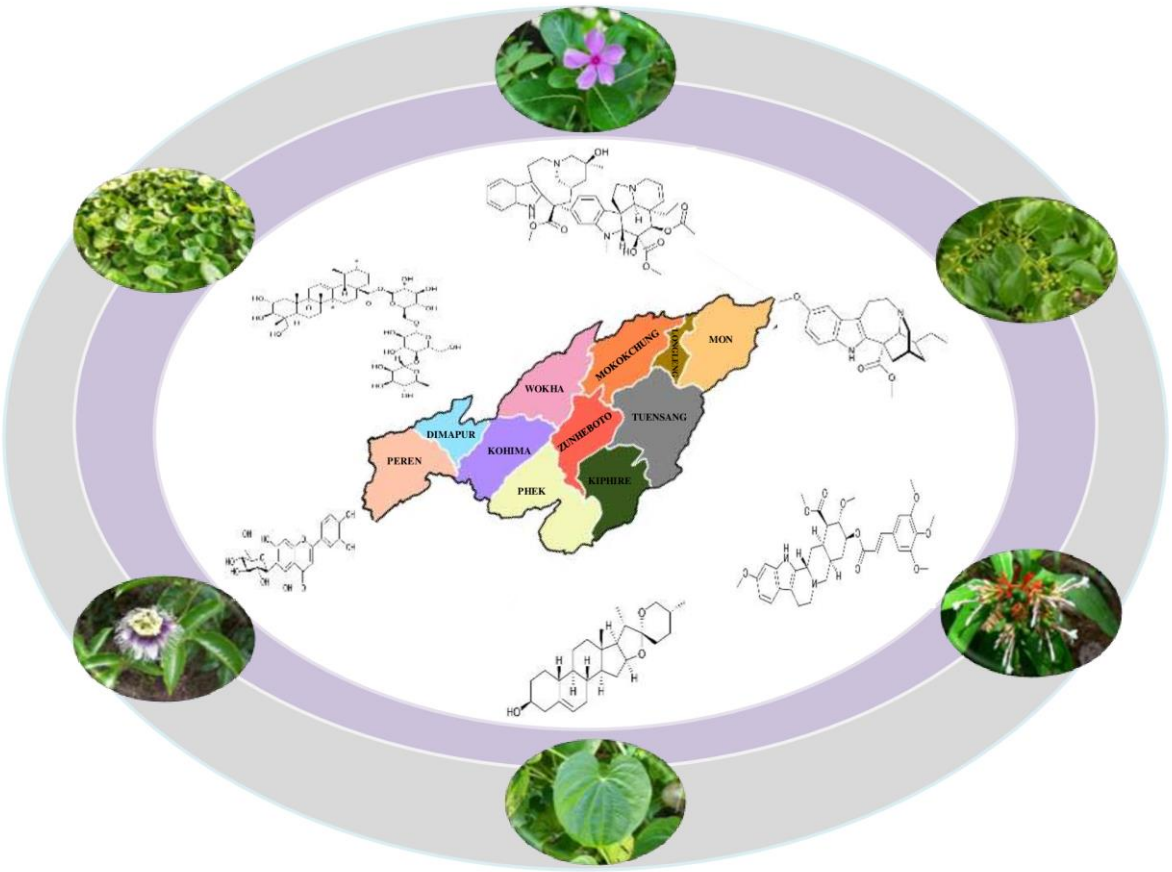

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Abstract:

An ethnobotanical documentation on the medicinal plants used by local people of Nagaland, (North-east India) has been presented here. The study explored 33 plant species (with their local names, indigenous applications, sources/origins, parts of plants used, bioactive compounds present, process of preparing medicines from the plants) belonging to 28 families have been reviewed thoroughly. Some examples are, *Catharanthus roseus* (*Tsuinrinaro*, Periwinkle), *Acacia pennata* (*Chakrangaing*, Ballikhadira), *Adhatoda vasica* (*Kicharangnaro,* Malabar-nut), *Ageratum conzyoides* (*Imchenriza*, Billy-goat-weed, /Tropical-white-weed), *Alstonia scholaris* (*Lazarongpang*, Blackboard), *Rauvolfia serpentina* (*Per-mozutong***,** Indian-snakeroot) etc. Plant based drugs are very popular and effective in Nagaland from ancient times but thorough-documentation with scientific-background of effectiveness, active chemical-compounds present, their action-mechanism etc. are still scanty. Such review can be of useful for pharmacologist, phyto-chemists to a broad group of researchers and may lead to discovery of new sources of novel medicines through traditional therapeutic knowledge.

Keywords: North-east India, Nagaland, Ethno-botanic review, Traditional medicines, Plant based drugs.

1. Introduction

Much of traditional remedy today, be it primarily based on the Ayurveda, Unani, Chinese traditional medicine system, has its starting origin in early discoveries. For centuries tremendous plant species have also been utilized as therapeutic medicines, all over the globe. WHO estimates point out that 80% of the human population, mainly in developing countries still depends on plant-based medicinal treatments for initial care WHO 1978 (Handral et al., 2012). Nagaland is a trans-border region of India. It borders Myanmar. Dimapur is one of the twelve districts of Nagaland. Dimapur district is

inhabited by sixteen indigenous tribes (Ao, Lotha, Angami, Sema, Sangtam, Konyak, Pochuri, Rengma, etc), jointly regarded as the "Nagas". The aboriginal Naga Tribes have a wealthy knowledge; build totally on their very own herbal richness, of native folk traditions. After generations of trial, regularly at the danger of loss of individual life, they have found out ways to utilize local plants to treat multiple ailments. Their beliefs and folk cultural methods are based on previous knowledge dealing with a variety of illnesses and their cures (Changkija, 1999). The ethnic communities are still using plant-based medicinal products and this traditional knowledge is carried over since ancient ages. Medicinal plants of Nagaland possess a prolonged history of several economic, ethnic, and ethnobotanical implementations. Ethnobotany is the study of interrelations between humans and plants; however, the current use of the term implies the study of indigenous or traditional knowledge of plants. It involves the indigenous knowledge of plant classification, cultivation, and use as food, medicine, and shelter. Detail and careful documentation of the relationship between tribal communities and plants is the key factor for ethnobotanical studies. Ethnobotany has evolved as a discipline by itself that speculates all types of interrelations between humans and plants (Iwu, 2002). There are huge prospects of these naturally occurring therapeutic plants to be used in numerous cultures, with immense therapeutic application truly denoting it as a remedial plant that can serve as an effective basis for the development and discovery of modern therapeutic medicine. The biologically active compounds need to systematize according to the usage of the bioactive compound present in the plant. Despite the vast usage of local medicinal plants, proper documentation with the scientific background of the effectiveness of these natural drugs and their mechanism of action are not yet explored in detail.

Alkaloids are very common and popular bioactive compounds extracted from herbal origin. These bioactive compounds are viewed as integral factors for human health due to their possession of vast medicinal importance. Alkaloids compounds are recognized to possess antimicrobial, anti-cancerous, antihypertensive, and huge additional biological interest (Tyagi et al., 2012). The present report contains a total of thirty-three species that are extensively used for a therapeutic reason by the tribal society. The species are arranged alphabetically by their scientific botanical names. The scientific

name of the plant species, the local/common name, the parts utilized, and the presence of bioactive compounds present in the plants are furnished. The reference details for citing the possible active chemical components are also mentioned. The existing review has been currently taken out to describe the usage of naturally available indigenous traditional therapeutic medicine dwelling in Nagaland.

2. Study site

Dimapur, one of the districts belonging to the state Nagaland of North Eastern part of India prolonged between longitude 93.7266° E and latitude 25.9091° N, comprises of area 139.3 km2 with an average rainfall of 1560 mm. According to the 2011 census the total population is 122,834. The number of females is 58,534 and males is 64,300. About 86.03% is the literacy rate (Jamir et al., 1999). In Nagaland, nearly about 329 km2 comprises conserve forest and about 518 km2 in minor patches disperse over the entire state which is specified as preserved forests. Additionally presence of separate blocks of jungle that are regarded by the local community as associating with them. Therefore, only 15% of the total surface of the state is forest area (Jamir et al., 1999). Northeast in general forms a unique bio-geographic region encompassing important biomes identified in the globe. It has an ample amount reservoir of the unique plant variety in the country and it has been stated that it is one of the major 'biodiversity hotspots of the globe which supports about 50% of India's rich biodiversity (Mao et al., 2009).

3. Methodology

Several areas were considered for the collection of several plant species. Information on the plant species was collected through interviewing the local people verbally, mainly elderly people, 'kobiras' (tribal medicinal practitioner). Throughout the interviews, the local name of the plants, parts of the plant used, method of preparing the medicine, mode of application, and amount of medicine used was recorded. All gathered data was cross-checked with the local people of neighboring villages (chekiye, kuda, thahekhu, kacharigaon, phaipijjang, etc) where the plants were collected. Also, there was a comparison made between the knowledge and information provided by the local people and from the literature available. A systematic analysis search of active compounds present in the indigenous

medicinal plants was carried out through various search engines i.e. Google Scholar, Springer, PubMed, Taylor and Francis imprints, Science Direct, NCBI (National Centre for Biotechnology Information), SciFinder, Chemspider, Ph.D. thesis, review and research from peer-reviewed journals, Wikipedia, webpages, ethnobotanical books, etc. An extensive search was employed to get the maximum information currently available on the indigenous plants of Nagaland by using the following keywords (indole alkaloids; medicinal plants of Nagaland; the name of the medicinal plants etc). Figure 2 indicates the map of Nagaland. The plants of this location were referred for plant identification.

4. Results and Discussion

A total of 33 plants species belonging to 33 genera were identified as being used for the treatment of approximately 35 ailments (Table 1). Rubiaceae, Apocynaceae, Solanaceae families had the largest number of plants used; and the largest number of preparations used were for hypertension, diarrhea, blood pressure, and fever. Mostly leaves were used for preparations of medicines for different ailments. Water is used exclusively in the preparation of medicines. Some of the plants recorded in the present work are well-known as medicinal plants. But an interesting observation is that the "Naga" tribes are using them for different therapeutic uses. The following bioactive compound present in this study is new observations made among tribal medicine in Dimapur district, Nagaland. They were not reported earlier, only the plants and their active uses were known and not their potential phytochemical properties. Plants are always the main part of drug discovery and its development. Extensive use of these herbal products is due to the possession of lesser side effects or no side effects. The presence of diverse phytochemicals in the indigenous medicinal plant of Nagaland, in turn, can be beneficial and important to develop some potential drugs with numerous therapeutic uses. Alkaloids are bioactive molecules that are mostly derived from natural sources and are usually considered an important element for human health due to their wide usage as medicinal value. Plant alkaloids are known to possess antihypertensive, antimicrobial, anticancerous, and various other biological activities. At the same time, Indole alkaloids are classes of alkaloids that contain structural moiety of indole possessing numerous biological properties including antioxidant, anti-ulcer, analgesic,

antimalarial, and regulation of central and peripheral nervous systems, etc (Peng et al., 2019). To sum up, the ethnobotanical knowledge system of tribal medicinal plants of Nagaland and its bioactive compound, present valuable information to future drug development against various diseases.

Some of the representative bioactive compounds are described below:

1. Vasicine: *Adhatoda vasica nees*, a member of the Acanthaceae family of plants, produce vasicine, a heterocyclic alkaloid with a quinazoline nucleus, which is largely found in its leafy parts of the plant. According to studies done on guinea pigs, vasicine has been demonstrated to cause bronchoconstriction, bronchodilation, tracheal muscle contraction, and relaxation at different concentrations, as well as protection from bronchospasm (histamine-induced). Vasicine releases prostaglandins when exposed to estrogen, which has uterotonic stimulating and oxytocic activity and has abortifacient effects. Vasicine has uterotonic, oxytocic, and abortifacient properties (Nepali et al. 2013).

2. Aegeline: Aegeline belongs to the family of alkaloidal-amide bioactive that was extracted from the stems and leaves of *Aegle marmelos* and has been demonstrated to have anti-dyslipidemic and anti-hyperglycemic effects in type 2 diabetic animal models. By activating the PI3-kinase-Rac1-PAK1-cofilin pathway in skeletal muscle cells, aegeline promotes the transport of glucose through independent routes that are dependent on Rac1 and Akt (Gautam et al. 2015).

3. Ajoene: Garlic-derived ajoene (4,5,9-trithiadodeca-1,6,11-triene-9-oxide) is considerably more chemically stable compared to allicin while it is synthesized most effectively from pure allicin. The anti-microbial, anti-thrombosis, and cholesterol-reducing properties of ajoene are some of its best-known biological functions. Ajoene has significant inhibitory impacts on thrombus development, platelet activation, and platelet binding to injured blood vessels. Ajoene also reduces cholesterol biosynthesis, prevents the tyrosine phosphatase activity and lipoxygenase pathway in human platelets, and delays platelet reduction from circulation over 3–4 hours. Ajoene exhibited antiviral and anti-

microbial activity while achieving a 73% healing rate of anti-mycotic drugs for the treatment of tinea cruris and tinea corporis (Hassan 2004).

4. Anthraquinones: A class of bioactive molecules known as anthraquinones is prevalent in a wide variety of naturally occurring substances. They belong within the quinine category. The largest class of organic natural pigments is the anthraquinones, which include about 700 known molecules. Anthracene rings, which are tricyclic aromatic rings and the fundamental structure of anthraquinones, are attached at points 9 and 10 with carbonyl groups. Both their natural free form (aglycone) and its glycosylated forms can be detected. They possess amazing bioactive potential. The antitumor, anticancer, anti-arthritic, anti-inflammatory, anti-bacterial, anti-malarial, and anti-fungal properties of several of these substances make them stand out. Anthraquinones are synthesized in plants through the polyketide route and the shikimic acid pathway. Anthraquinones have a wide range of uses in biology in addition to being widely employed as colors and in the production of pulp (Diaz-Muñoz et al. 2018).

5. Capsaicin: The distinctive bioactive alkaloid capsaicin (trans-8-methyl-N-vanillyl-6-nonenamide), which gives the *Capsicum* plant its spiciness, is mainly present there. It is a lipophilic, crystalline, odorless, and colorless alkaloid. The pharmaceutical and food industries depend on such bioactive molecules. Due to this, numerous researchers are exploring ways to increase the manufacturing process, whether it be through the modification of chili pepper cultivation, enzymatic synthesis, chemical synthesis, or different techniques like cell culture. According to studies conducted to date, capsaicin specifically exhibits an extensive variety of physiological and pharmacological activities resulting in properties like anti-carcinogens, antioxidants, and stimulants that promote the metabolism of energy and reduce storage of fat, and anti-inflammatories (De Lourdes Reyes-Escogido et al. 2011).

6. Vinblastin: A vinca family bioactive alkaloid found in periwinkle plants is vinblastin. It is an antineoplastic drug used for the treatment of cancers of the breast, testicles, and lymphoma. In the course of treatment of lymphoma associated with Hodgkin's disease, it may be administered in combination with other chemotherapy medications. Vinblastin sulfate, an off-white powder that is soluble in liquids such as methanol and water, is how it is administered effectively. Since the unveiling of their potential anticancer action, vinca alkaloids have drawn greater interest. These substances are widely known for their anti-leukemic properties. Vinblastin inhibits the process of polymerization of tubulin to generate microtubules and promotes the breakdown of tubules that have already formed to have an anti-cancer effect. Despite vinblastin's significance for biological processes, it has several undesirable consequences such as thrombocytopenia peripheral convulsions, neuritis, and leucopenia (Tyagi et al. 2012).

7. Rutin: A flavonoid known as rutin (3,3′,4′,5,7-pentahydroxyflavone-3-rhamnoglucoside), is an abundant compound in the botanical plants. Rutin possesses an extensive range of therapeutic qualities that have been utilized in human nutrition and medicine, such as its antioxidative execution. Traditionally, it has been utilized as an anti-fungal, anti-microbial, and anti-allergic agent. However, recent studies have demonstrated its wide-ranging pharmacological advantages for facilitating the treatment of several chronic illnesses, including diabetes, cancer, hypercholesterolemia, and hypertension. (Excli Journal 2005)

8. Asiaticoside: Triterpene saponins called asiaticoside are composed of an aglycone triterpene moiety with more than one sugar in their side chains. Each of these particular phytochemicals has anti-inflammatory, hypocholesterolemic, contraceptive, antifungal, and frothing effects. Most triterpenes, which consist of asiaticoside, madecassic, and asiatic acid, comprise the largest group of molecules with biological activity in *C. asiatica*. They are acrid, chilly flavour, and sweet known as asiaticoside. They are commonly used extensively in numerous medical applications as anti-inflammatory agents, antidepressants, antioxidants, and anti-tumor agents. Additionally, it prevents

neurons from dying, enhances memory, and lowers pain in the rat study. Asiaticoside has anti-hepatofibrotic, anti-inflammatory, and antioxidant properties. It improved cognitive impairment and reduced oxidative stress in diabetes patients (Rjeibi et al., 2015).

9. Kaempferol: A flavonoid known as kaempferol, or 3,5,7-trihydroxy-2-(4-hydroxyphenyl)-4H-1-benzopyran-4-one, is present in a variety of plants that are edible and herbal items that are frequently employed in traditional treatments. According to various studies in epidemiology, consuming products having kaempferol lowers your chance of acquiring a number of ailments, including cardiovascular and cancer. Kaempferol along with certain of its constituents has a broad spectrum of medicinal properties, which includes anticancer, antioxidant, neuroprotective, anti-inflammatory, cardioprotective, antimicrobial, anti-osteoporotic, anxiolytic, estrogenic, antiestrogenic, anti-allergic and analgesic activities, according to a number of preclinical research studies. The beneficial health effects obtained from plants that contain kaempferol may help this flavonoid bioactive compound become a potential molecule for both the prevention and treatment of several illnesses (Calderón-Montaño et al. 2011).

10. Diosgenin: Diosgenin is a kind of sapogenin that exists in the fruit of *Dioscorea bulbifera*. Bioactive compounds that are naturally active are being utilized to treat a variety of diseases, including hypercholesterolemia, cancer, leukemia, and inflammation. It serves as a usual first intermediary in the production of sex hormones, oral contraceptives, and steroidal chemicals. Dehydroepiandrosterone synthesis and the preservation of appropriate levels of cholesterol in the blood have both been demonstrated as potential benefits of diosgenin. This compound distribution over an extended period of time greatly reduces the loss of bone. It possesses extremely amazing pharmacological characteristics and may one day be utilized as a drug to treat various problems, which will help researchers create new methods for treating a variety of diseases (Patel et al. 2012).

11 Aucubin: Several indigenous herbal remedies including *Eucommia ulmoides*, *Plantago asiatica*, and *Aucuba japonica* contain aucubin, an iridoid-glycoside. It is a very potent substance with a wide range of potential biological actions, namely hepatoprotective, anti-aging, anti-cancer, neuroprotective qualities, anti-inflammatory, and anti-fibrotic. In rat species, it has been demonstrated that aucubin has low oral bioavailability and is broadly dispersed in a number of organs, such as the kidney, heart, liver, lung, and spleen. There is also a gender distinction in aucubin uptake. Aucubin is well tolerated, and no significant negative effects were noted thus far. Aucubin is a chemical possessing several potential properties, excellent safety, and a wide range of advantageous physiological characteristics. It has tremendous potential for application in pharmacology and therapeutic (Zeng et al. 2020).

12. Ajmalicine: Ajmalicine has a broad spectrum of benefits for the treatment of cardiovascular diseases, particularly in restoring regular blood flow to the brain. It influences how the vascular system functions, contributes to avoiding strokes, and lowers the level of blood pressure. The pharmaceutical industry isolates about 3500 kg each year from Catharanthus and Rauvolfia species to combat diseases of the circulatory system. The process of synthesis of loganin, that is then converted to secoloanin upon oxidation, begins with geraniol and proceeds through irdotrial and iridodial. This contributes to in the development of a potentially ajmalicine-producing from tryptamine. The amino acid tryptophan is transformed to tryptamine by secologanin, cathenamine, and strictosidine from which ajmalicine is produced (Kumari et al. 2013).

13. Isoorientin: Since it has a diverse range of medicinal properties, isoorientin is a naturally occurring C-glucosyl flavone that has been attracting an increasing amount of attention. Experiments also progressively demonstrated the significance of isoorientin's potent antioxidant and anti-inflammatory effects in reducing a variety of metabolic problems. Isoorientin is soluble in ethanol and water and, like the majority of flavone's bioactive compounds, has moderate-to-strong oxygen base chemical characteristics. Isoorientin-rich medicinal plants have shown substantial protection

against problems like hyperglycemia, hyperlipidemia, and insulin resistance. It has negative side effects when used to treat metabolic illnesses, specifically diabetes, insulin resistance, and obesity, as well as related complications (Ziqubu et al. 2020).

14. Quercitin: A flavonol, quercetin (3,3,4,5,7-pentahydroxyl-flavone) is an example of a secondary bioactive metabolite that occurs in medicinal plants known as flavonoids. A pigmented chemical compound found in abundance in many different indigenous plant species, quercetin. With regard to ethnopharmacology, it is significant due to its function as a neuroprotective, antioxidant, and anticancer agent. This is being described as a potent free radical scavenger and antioxidant. Quercetin was recently found to possess a blocking impact on the enzyme tyrosine kinase during phase I of clinical experiments, which raises the prospect of whether it may possess anticancer treating possibilities. This diverse chemical quercetin has a wide range of therapeutic benefits, comprising antioxidant, anticancer, neurologic, antiviral, antibacterial, cardiovascular, anti-inflammatory, anti-obesity, and hepato-protective activities (Maalik et al. 2014).

15. Rescinnamine: Rescinnamine is an alseroxylon portion refined ester bioactive alkaloid isolated from *Rauvolfia serpentina* species. As an antihypertensive treatment agent, it is employed for treating hypertension. From a clinical perspective, this serves as a less effective chemical compound therefore is ineffective as well to decrease blood pressure levels. This prevents the peptidyl dipeptidase angiotensin-converting enzyme from catalyzing the transformation of angiotensin I to angiotensin II, and that in turn increases the release of aldosterone from the adrenal cortex. Angiotensin I cannot be converted to angiotensin II because the angiotensin-converting enzyme (ACE) is initially inhibited. Angiotensin II levels in the plasma are reduced by ACE inhibitor. Due to the vascular constrictor properties of angiotensin II and its role as a negative feedback modulator for renin activity, its reduced levels lower cholesterol levels and stimulate the baroreceptor reaction processes, and this leads to the release of aldosterone (Kumari et al. 2013).

16. Apigenin: Apigenin is a pale yellow crystalline substance that belongs under the flavone class and is the aglycone of numerous organically generated glycosides. The name of its chemical compound is 4′, 5, 7,-trihydroxyflavone. The substance is dissolved in solvents that are organic and insoluble in water. Apigenin is said to have a wide range of medicinal properties, such as anti-inflammatory, anti-cancer, anti-toxic, etc. It has a wide range of molecules that have an effect on inflammation as evidenced by research. It is an effective therapeutic agent to treat disorders like autoimmune disorders, rheumatoid arthritis, Alzheimer's disease, Parkinson's disease, & several kinds of cancer, according to in vitro, in vivo, and clinical trial investigations. Their overall bioavailability is increased by prolonged clearance from the plasma and slower hepatic breakdown, resulting in it being a promising treatment in drug investigations (Ali et al. 2017).

17. Olivacine: The alkaloid olivacine (1,5-dimethyl-6H-pyrido[4,3-b]carbazole) was initially extracted from the outermost layer of the bark of Aspidosperma olicaceum. It exhibits a biological function that is multidirectional. Their antiproliferative impact, which is associated with a number of processes, including the enzymes, kinases, suppression of growth factors, and others, is remarkable. On cell lines from different tumors, the impact of olivacine & its derived compounds was examined. Throughout future years, these might replace doxorubicin as the primary novel antitumor medicine because the therapeutic effects of especially potent olivacine analogues were greater (Tylińska & Wiatrak 2021).

18. Gingerol: Globally, people use the underground root system of ginger, Zingiber officinale, primarily as a spice and natural remedy. It includes spicy phenolic chemically bioactive compounds called gingerols together. The primary chemically bioactive component in ginger is 6-gingerol, because the portion within the compound that is potent comprises an aliphatic chain moiety with a hydroxyl group. Numerous biological properties, such as anti-inflammation, anticancer, anti-platelet aggregation, antifungal, and anti-oxidation are believed to be linked to it. Through its influence upon a number of biological functions including

apoptosis, cytotoxic action, angiogenesis suppression, and cell cycle control, 6-gingerol (1-[4'-hydroxy-3'-methoxyphenyl]-5-hydroxy-3-decanone) is believed to have anti-cancer properties (Wang et al. 2014).

5. Conclusion

This short ethnobotanical investigation highlights the bioactive components; thus helps in the understanding of drug actions (which are being used for years), with huge potential of medicinal values. Such plants are valued for their traditional medicinal applications for ages. The different isolated bioactive compounds extract and from the mentioned species exhibited a variety of pharmacological ventures. The individual species were studied in detail concerning their bioactive compound and therapeutic properties focusing on floral and medicinal significance. Nevertheless, the complete pharmacological understandings of this traditional, indigenous variety are yet to be done. Those will eventually entitle to build their medical and industrial importance. In this study, we conclude that a huge variety of medicinal plants from Nagaland/NE India having various effective applications; deeper understanding and exploration of action mechanism of those promises tremendous potential towards future drug expansion.

6. Conflict of interests

No potential conflicts of interest were reported by the authors to the best of their knowledge.

7. Acknowledgement

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References

A. Chatterjee SB and SKS. 1958. Studies on the Constitution, Stereochemistry, and Synthesis of Aegeline, an Alkaloidal-Amide of Aegle marmelos Correa. J Org Chem. 24:687–689.

AlAjmi MF, Alam P, Siddiqui NA, Basudan OA, Hussain A. 2015. Quantitative analysis of

biomarker rutin in different species of genus Ficus by validated NP and RP-HPTLC methods. Pak J Pharm Sci. 28(6 Suppl):2213–22120.

Ali F, Rahul, Naz F, Jyoti S, Siddique YH. 2017. Health functionality of apigenin: A review. Int J Food Prop [Internet]. 20(6):1197–1238. http://dx.doi.org/10.1080/10942912.2016.1207188

Arul Ananth D, Sivasudha T, Rameshkumar A, Jeyadevi R, Aseervatham SB. 2013. Chemical constituents, in vitro antioxidant and antimicrobial potential of Caryota urens L. Free Radicals Antioxidants [Internet]. 3(2):107–112. http://dx.doi.org/10.1016/j.fra.2013.05.008

Ayaz M. 2016. Phytochemical Studies, Investigation of Anti-Alzheimer and Anti-Cancer Potentials of Polygonum Hydropiper L. Thesis Degree Dr Philos.:1–260.

Briggs LH, Nicholls GA. 1954. Chemistry of the coprosma genus. Part VIII. The occurrence of asperuloside. J Chem Soc. 1807(3940):3940–3943.

Brockman H. 2016. Renewable chemicals and bioproducts: a potential for agricultural diversification and economic development. [place unknown].

Calderón-Montaño JM, Burgos-Morón E, Pérez-Guerrero C, López-Lázaro M. 2011. A Review on the Dietary Flavonoid Kaempferol | BenthamScience. Mini Rev Med Chem [Internet]. 11(4):298–344. http://www.eurekaselect.com/87782/article%5Cnhttp://personal.us.es/mlopezlazaro/2011. MRMC. Kaempferol.pdf%5Cnhttp://www.ncbi.nlm.nih.gov/pubmed/21428901

Del Caro A, Piga A. 2008. Polyphenol composition of peel and pulp of two Italian fresh fig fruits cultivars (Ficus carica L.). Eur Food Res Technol. 226(4):715–719.

Cazarin CBB, da Silva JK, Colomeu TC, Batista ÂG, Meletti LMM, Paschoal JAR, Bogusz Junior S, de Campos Braga PA, Reyes FGR, Augusto F, et al. 2015. Intake of Passiflora edulis leaf extract improves antioxidant and anti-inflammatory status in rats with 2,4,6-trinitrobenzenesulphonic acid induced colitis. J Funct Foods [Internet]. 17:575–586. http://dx.doi.org/10.1016/j.jff.2015.05.034

Chaiyasit K, Khovidhunkit W, Wittayalertpanya S. 2009. Pharmacokinetic and the effect of capsaicin

in capsicum frutescens on decreasing plasma glucose level. J Med Assoc Thail. 92(1):108–113.

Chambers JA. 2011. The Rise of Chinese Military Medicine: Opportunity for Mercy Ship, not Gunboat, Diplomacy. Mil Med. 176(9):1043–1050.

Changkija S. 1999. Folk Medicinal Plants of the Nagas in India. Asian Folkl Stud. 58(1):205–230.

Choi S, Chung MH. 2003. A review on the relationship between aloe vera components and their biologic effects. Semin Integr Med. 1(1):53–62.

Das C, Poi R, Chowdhury A. 2005. HPTLC determination of vasicine and vasicinone in Adhatoda vasica. Phytochem Anal. 16(2):90–92.

Davis RH, Agnew PS, Shapiro E. 1986. Antiarthritic activity of anthraquinones found in aloe for podiatric medicine. J Am Podiatr Med Assoc. 76(2):61–66.

Deng J, Zhou Y, Bai M, Li H, Li L. 2010. Anxiolytic and sedative activities of Passiflora edulis f. flavicarpa. J Ethnopharmacol. 128(1):148–153.

Diaz-Muñoz G, Miranda IL, Sartori SK, de Rezende DC, Diaz MAN. 2018. Anthraquinones: An Overview. Stud Nat Prod Chem. 58:313–338.

Doley P, Singh A, Devi NM, Singh CB, Thokchom A. 2016. Reverse phase HPLC estimation of antioxidants and antimicrobial activities of Clerodendrum colebrookianum Walp. J Pharmacogn Phytochem. 5(3):199–205.

Dwivedi V, Tripathi S. 2014. Review study on potential activity of Piper betle. J Pharmacogn Phytochem JPP. 93(34):9398.

Eleazu CO, Iroaganachi M, Eleazu KC. 2013. Ameliorative potentials of cocoyam (Colocasia esculenta L.) and unripe plantain (Musa paradisiaca L.) on the relative tissue weights of streptozotocin-induced diabetic rats. J Diabetes Res.:1–8.

Funk JL, Frye JB, Oyarzo JN, Timmermann BN. 2009. Comparative effects of two gingerol-containing zingiber officinale extracts on experimental Rheumatoid arthritis. J Nat Prod. 72(3):403–

407.

Gautam S, Ishrat N, Singh R, Narender T, Srivastava AK. 2015. Aegeline from Aegle marmelos stimulates glucose transport via Akt and Rac1 signaling, and contributes to a cytoskeletal rearrangement through PI3K/Rac1. Eur J Pharmacol [Internet]. 762:419–429. http://dx.doi.org/10.1016/j.ejphar.2015.05.021

Gebreyohannes G, Gebreyohannes M. 2013. Medicinal values of garlic: A review. Int J. 5(9):401–408.

Ghimeray AK, Jin CW, Ghimire BK, Dong HC. 2009. Antioxidant activity and quantitative estimation of azadirachtin and nimbin in Azadirachta Indica A. Juss grown in foothills of Nepal. African J Biotechnol. 8(13):3084–3091.

Ghosh S, More P, Derle A, Kitture R, Kale T, Gorain M, Avasthi A, Markad P, Kundu GC, Kale S, et al. 2015. Diosgenin functionalized iron oxide nanoparticles as novel nanomaterial against breast cancer. J Nanosci Nanotechnol. 15(12):9464–9472.

Hassan HT. 2004. Ajoene (natural garlic compound): A new anti-leukaemia agent for AML therapy. Leuk Res. 28(7):667–671.

Huang HC, Syu KY, Lin JK. 2010. Chemical composition of Solanum nigrum linn extract and induction of autophagy by leaf water extract and its major flavonoids in AU565 breast cancer cells. J Agric Food Chem. 58(15):8699–8708.

Ibrahim M, Rehman K, Razzaq A, Hussain I, Farooq T, Hussain A, Akash MSH. 2018. Investigations of phytochemical constituents and their pharmacological properties isolated from the genus urtica: Critical review and analysis. Crit Rev Eukaryot Gene Expr. 28(1):25–66.

Ignacimuthu S, Shanmugam N. 2010. Antimycobacterial activity of two natural alkaloids, vasicine acetate and 2-acetyl benzylamine, isolated from Indian shrub Adhatoda vasica Ness. leaves. J Biosci. 35(4):565–570.

Jamir TT, Sharma HK, Dolui AK. 1999. Folklore medicinal plants of Nagaland, India. Fitoterapia. 70(4):395–401.

Jawla S, Kumar Y, Khan MSY. 2012. Antimicrobial and antihyperglycemic activities of Musa paradisiaca flowers. Asian Pac J Trop Biomed [Internet]. 2(2 SUPPL.):S914–S918. http://dx.doi.org/10.1016/S2221-1691(12)60336-0

Jia G, Lu X. 2008. Enrichment and purification of madecassoside and asiaticoside from Centella asiatica extracts with macroporous resins. J Chromatogr A. 1193(1–2):136–141.

Khizar Abbas, Uzma Niaz, Talib Hussain, M.Assif Saeed, Zeeshan Javaid AI and SR. 2014. Antimicrobial Activity of Fruits of Solanum Nigrum and Solanum Xanthocarpium. Acta Pol Pharm - Drug Res. 71(3):415–421.

Knowledge I, Sen S, Chakraborty R. 2020. Herbal Medicine in India. [place unknown].

Kostici R, Biţă A, Bejenaru LE, Bejenaru C, Popescu FD, Dan Mogoşanu G, Popescu F. 2019. HPTLC quantification of polyphenolic acids and antioxidant activity of Polygonum hydropiper l. Species from Romanian flora. Farmacia. 67(6):1005–1010.

Kregiel D, Pawlikowska E, Antolak H. 2018. Urtica spp.: Ordinary plants with extraordinary properties. Molecules. 23(7):1–21.

Kumar N, Khurana SMP. 2018. Phytochemistry and medicinal potential of the terminalia bellirica roxb. (bahera). Indian J Nat Prod Resour. 9(2):97–107.

Kumari R, Rathi B, Rani A, Tiwari SM, Bhatnagar S. 2013. Rauvolfia serpentina L. Benth. ex kurz.: Phytochemical, pharmacological and therapeutic aspects. Int J Pharm Sci Rev Res. 23(2):348–355.

Leete E, Louden MCL. 1968. Biosynthesis of Capsaicin and Dihydrocapsaicin in Capsicum frutescens. J Am Chem Soc. 90(24):6837–6841.

Lemieux G, Davignon A, Genest J. 1956. Treatment of arterial hypertension with rescinnamine, a new alkaloid isolated from Rauwolfia serpentina. Can Med Assoc J. 74(2):144–145.

León F, Habib E, Adkins JE, Furr EB, McCurdy CR, Cutler SJ. 2009. Phytochemical characterization of the leaves of Mitragyna speciosa grown in USA. Nat Prod Commun. 4(7):907–910.

Liu Z, Xu Z, Zhou H, Cao G, Cong XD, Zhang Y, Cai BC. 2012. Simultaneous determination of four bioactive compounds in Verbena officinalis L. by using high-performance liquid chromatography. Pharmacogn Mag. 8(30):162–165.

De Lourdes Reyes-Escogido M, Gonzalez-Mondragon EG, Vazquez-Tzompantzi E. 2011. Chemical and pharmacological aspects of capsaicin. Molecules. 16(2):1253–1270.

Loyaga-Castillo M, Calla-Poma RD, Calla-Poma R, Requena-Mendizabal MF, Millones-Gómez PA. 2020. Antifungal activity of peruvian banana peel (Musa paradisiaca L.) on candida albicans: An in vitro study. J Contemp Dent Pract. 21(5):509–514.

Maalik A, Khan FA, Mumtaz A, Mehmood A, Azhar S, Atif M, Karim S, Altaf Y, Tariq I. 2014. Pharmacological applications of quercetin and its derivatives: A short review. Trop J Pharm Res. 13(9):1561–1566.

Mahady GB, Pendland SL, Yun GS, Lu ZZ, Stoia A. 2003. Ginger (Zingiber officinale Roscoe) and the Gingerols Inhibit the Growth of Cag A+ Strains of Helicobacter pylori. Anticancer Res. 23(5 A):3699–3702.

Manda VK, Avula B, Chittiboyina AG, Khan IA, Walker LA, Khan SI. 2016. Inhibition of CYP3A4 and CYP1A2 by Aegle marmelos and its constituents. Xenobiotica. 46(2):117–125.

Le Mée S, Pierré A, Markovits J, Atassi G, Jacquemin-Sablon A, Saucier JM. 1998. S16020-2, a new highly cytotoxic antitumor olivacine derivative: DNA interaction and DNA topoisomerase II inhibition. Mol Pharmacol. 53(2):213–220.

Mehrotra NN, Ojha SK, Tandon S. 2007. Drug Development for Cardiovascular Diseases from Ayurvedic Plants. Curr R D Highlights.:1–89.

Miraj S, Kiani S. 2016. Study of pharmacological effect of Verbena officinalis Linn: A review. Der

Pharm Lett. 8(9):321–325.

Nepali K, Sharma S, Ojha R, Dhar KL. 2013. Vasicine and structurally related quinazolines. Med Chem Res. 22(1):1–15.

Nikhil Kumar, Pragya Misra, Anuradha Dube, Shailja Bhattacharya MD and SR. 2010. Piper betle Linn. a maligned Pan-Asiatic Plant with an array of pharmacological activities and prospects for drug discovery. Curr Sci. 99(7):922–932.

Nugroho AE, Riyanto S, Sukari MA, Maeyama K. 2011. Effects of aegeline, a main alkaloid of Aegle marmelos Correa leaves, on the histamine release from mast cells. Pak J Pharm Sci. 24(3):359–367.

Olafsdottir ES, Bolt Jorgensen L, Jaroszewski JW. 2002. Cyanogenesis in glucosinolate-producing plants: Carica papaya and Carica quercifolia. Phytochemistry. 60(3):269–273.

Patel K, Gadewar M, Tahilyani V, Patel DK. 2012. A review on pharmacological and analytical aspects of diosgenin: a concise report. Nat Products Bioprospect. 2(2):46–52.

Pradhan AB, Haque L, Bhuiya S, Das S. 2015. Exploring the mode of binding of the bioflavonoid kaempferol with B and protonated forms of DNA using spectroscopic and molecular docking studies. RSC Adv. 5(14):10219–10230.

Rekha VPB, Kollipara M, Srinivasa Gupta BRSS, Bharath Y, Pulicherla KK. 2014. A Review on Piper betle L.: Nature's Promising Medicinal Reservoir. Am J Ethnomedicine [Internet]. 1(5):276–289. www.ajethno.comhttp://www.ajethno.com

Ried K, Fakler P. 2014. Potential of garlic (Allium sativum) in lowering high blood pressure: Mechanisms of action and clinical relevance. Integr Blood Press Control. 7:71–82.

Rijhwani SK, Shanks J V. 1998. Effect of Elicitor Dosage and Exposure Time on Biosynthesis of Indole Alkaloids by Catharanthus roseus Hairy Root Cultures. Biotechnol Prog. 7938(98):442–449.

Rimando AM, Han BH, Park JH, Cantoria MC. 1986. Studies on the constituents of Philippine Piper betle leaves. Arch Pharm Res. 9(2):93–97.

Riyanto S, Sukari MA, Rahmani M. 2001. Alkaloids from Aegle marmelos (Rutaceae). Malaysian J Anal Sci. 7(2):463–465.

Rjeibi1* I, , Anouar Ben Saad1 , Sana Ncib2 SS, 1Research. 2015. Journal of Coastal Life Medicine. J Coast Life Med [Internet]. 5(8):343–349. http://www.jclmm.com/qk/20159/2.pdf

S.C Deorani G. S. 2007. Medicinal Plants of Nagaland. [place unknown].

Sang S, Hong J, Wu H, Liu J, Yang CS, Pan MH, Badmaev V, Ho CT. 2009. Increased growth inhibitory effects on human cancer cells and anti-inflammatory potency of shogaols from Zingiber officinale relative to gingerols. J Agric Food Chem. 57(22):10645–10650.

Santos SAO, Freire CSR, Domingues MRM, Silvestre AJD, Neto CP. 2011. Characterization of phenolic components in polar extracts of eucalyptus globulus labill. Bark by high-performance liquid chromatography-mass spectrometry. J Agric Food Chem. 59(17):9386–9393.

Scharfenberg K, Wagner R, Wagner KG. 1990. The cytotoxic effect of ajoene, a natural product from garlic, investigated with different cell lines. Cancer Lett. 53(2–3):103–108.

Seigler DS, Pauli GF, Nahrstedt A, Leen R. 2002. Cyanogenic allosides and glucosides from Passiflora edulis and Carica papaya. Phytochemistry. 60(8):873–882.

Shahjabeen Sharif, Tanjida Ahmed, Md. Aminul Haque M. B and MS. 2014. Phytochemical Screenings, Thrombolytic Activity, Membrane Stabilizing Activity and Cytotoxic Properties of Polygonum hydropiper. Res J Med Plant. 8(2):92–98.

Shahwar D, Raza MA, Tariq S, Riasat M, Ajaib M. 2012. Enzyme inhibition, antioxidant and antibacterial potential of vasicine isolated from Adhatoda vasica Nees. Pak J Pharm Sci. 25(3):651–656.

Shrivastava A, Patel T. 2007. Clerodendrum and heathcare: An overview. Med Aromat Plant Sci Biotechnol. 1(1):142–150.

Singh AP, Singh DP, Srivastava S, Govindarajan R, Rawat AKS. 2007. A validated quantitative

HPTLC method for analysis of biomarkers in Ficus carica L. J Planar Chromatogr - Mod TLC. 20(6):437–441.

Smith Sanjay Jagtap J, Satpute R. 2014. Phytochemical Screening and Antioxidant Activity of Rhizome Extracts of Costus speciosus. J Acad Ind Res. 3(1):40.

Srivastav AK, Singh R, Manimegalai S, Rajeswari VD. 2015. Identification of flavonoids in methanolic extract of Caryota urens (fish tail palm): A phytochemical screening involving structure analysis by FTIR spectroscopy. Res J Phytochem. 9(3):127–136.

Srividya N, Sridevi BP SP. 1998. Azadirachtin and nimbin content in in vitro cultured shoots and roots of Azadirachta indica A. Juss. Indian J Plant Physiol. 3(2):129–134.

Stoeckel K. 1981. Pharmacokinetics of Rocephin®, a highly active new cephalosporin with an exceptionally long biological half-life. Chemotherapy. 27(Suppl. 1):42–46.

Tan ZJ, Li FF, Xu XL. 2013. Extraction and purification of anthraquinones derivatives from Aloe vera L. using alcohol/salt aqueous two-phase system. Bioprocess Biosyst Eng. 36(8):1105–1113.

Teixeira DM, Canelas VC, do Canto AM, Teixeira JMG, Dias CB. 2009. HPLC-DAD quantification of phenolic compounds contributing to the antioxidant: Activity of maclura pomifera, ficus carica and ficus elastica extracts. Anal Lett. 42(18):2986–3003.

Tyagi G, Charak S, Mehrotra R. 2012. Binding of an indole alkaloid, vinblastine to double stranded DNA: A spectroscopic insight in to nature and strength of interaction. J Photochem Photobiol B Biol [Internet]. 108:48–52. http://dx.doi.org/10.1016/j.jphotobiol.2011.12.009

Tylińska B, Wiatrak B. 2021. Bioactive olivacine derivatives—potential application in cancer therapy. Biology (Basel). 10(6).

Vázquez B, Avila G, Segura D, Escalante B. 1996. Antiinflammatory activity of extracts from Aloe vera gel. J Ethnopharmacol. 55(1):69–75.

Verma A, Laakso I, Seppänen-Laakso T, Huhtikangas A, Riekkola ML. 2007. A simplified procedure

for indole alkaloid extraction from Catharanthus roseus combined with a semi-synthetic production process for vinblastine. Molecules. 12(7):1307–1315.

Vij T, Prashar Y. 2015. A review on medicinal properties of Carica papaya Linn. Asian Pacific J Trop Dis [Internet]. 5(1):1–6. http://dx.doi.org/10.1016/S2222-1808(14)60617-4

Vishalakshi Devi D, Urooj A. 2010. Nutrient profile and antioxidant components of Costus speciosus Sm. and Costus igneus Nak. Indian J Nat Prod Resour. 1(1):116–118.

Wang L, Silva L, Di Rosa M, Marques C, Barreiros J, Cabri J. 2017. The "journal of functional morphology and kinesiology" journal club series: Highlights on recent papers in movement analysis. J Funct Morphol Kinesiol. 2(1):10–14.

Wang S, Zhang C, Yang G, Yang Y. 2014. Biological properties of 6-Gingerol: A brief review. Nat Prod Commun. 9(7):1027–1030.

Wijeweera P, Arnason JT, Koszycki D, Merali Z. 2006. Evaluation of anxiolytic properties of Gotukola - (Centella asiatica) extracts and asiaticoside in rat behavioral models. Phytomedicine. 13(9–10):668–676.

Williams DJ, Pun S, Chaliha M, Scheelings P, O'Hare T. 2013. An unusual combination in papaya (Carica papaya): The good (glucosinolates) and the bad (cyanogenic glycosides). J Food Compos Anal [Internet]. 29(1):82–86. http://dx.doi.org/10.1016/j.jfca.2012.06.007

Wohlmuth H, Leach DN, Smith MK, Myers SP. 2005. Gingerol content of diploid and tetraploid clones of ginger (Zingiber officinale Roscoe). J Agric Food Chem. 53(14):5772–5778.

Yamada N, Hattori A, Nishikawa T, Fukuda H, Fujino T. 2006. Prophylactic effects of ajoene on cerebral injury in stroke-prone spontaneously hypertensive rats (SHRSP). Biol Pharm Bull. 29(4):619–622.

Zbidah M, Lupescu A, Jilani K, Fajol A, Michael D, Qadri SM, Lang F. 2012. Apigenin-induced suicidal erythrocyte death. J Agric Food Chem. 60(1):533–538.

Zeng X, Guo F, Ouyang D. 2020. A review of the pharmacology and toxicology of aucubin. Fitoterapia [Internet]. 140:104443. https://doi.org/10.1016/j.fitote.2019.104443

Zeraik ML, Serteyn D, Deby-Dupont G, Wauters JN, Tits M, Yariwake JH, Angenot L, Franck T. 2011. Evaluation of the antioxidant activity of passion fruit (Passiflora edulis and Passiflora alata) extracts on stimulated neutrophils and myeloperoxidase activity assays. Food Chem [Internet]. 128(2):259–265. http://dx.doi.org/10.1016/j.foodchem.2011.03.001

Zeraik ML, Yariwake JH. 2010. Quantification of isoorientin and total flavonoids in Passiflora edulis fruit pulp by HPLC-UV/DAD. Microchem J. 96(1):86–91.

Zeraik ML, Yariwake JH, Wauters JN, Tits M, Angenot L. 2012. Analysis of passion fruit rinds (Passiflora edulis): Isoorientin quantification by HPTLC and evaluation of antioxidant (radical scavenging) capacity. Quim Nova. 35(3):541–545.

Ziqubu K, Dludla P V., Joubert E, Muller CJF, Louw J, Tiano L, Nkambule BB, Kappo AP, Mazibuko-Mbeje SE. 2020. Isoorientin: A dietary flavone with the potential to ameliorate diverse metabolic complications. Pharmacol Res [Internet]. 158:104867. https://doi.org/10.1016/j.phrs.2020.104867

Figures:

Figure 1. Photographs of medicinal plants, a. *Catharanthus roseus*, b. *Centella asiatica*, c. *Dioscorea bulbifera*, d. *Colubrina asiatica*, e. *Passiflora edulis*, f. *Rauvolfia serpentina*, vastly used in Dimapur district (Nagaland) for therapeutic purposes. More similar plant pictures are displayed in ESI.*

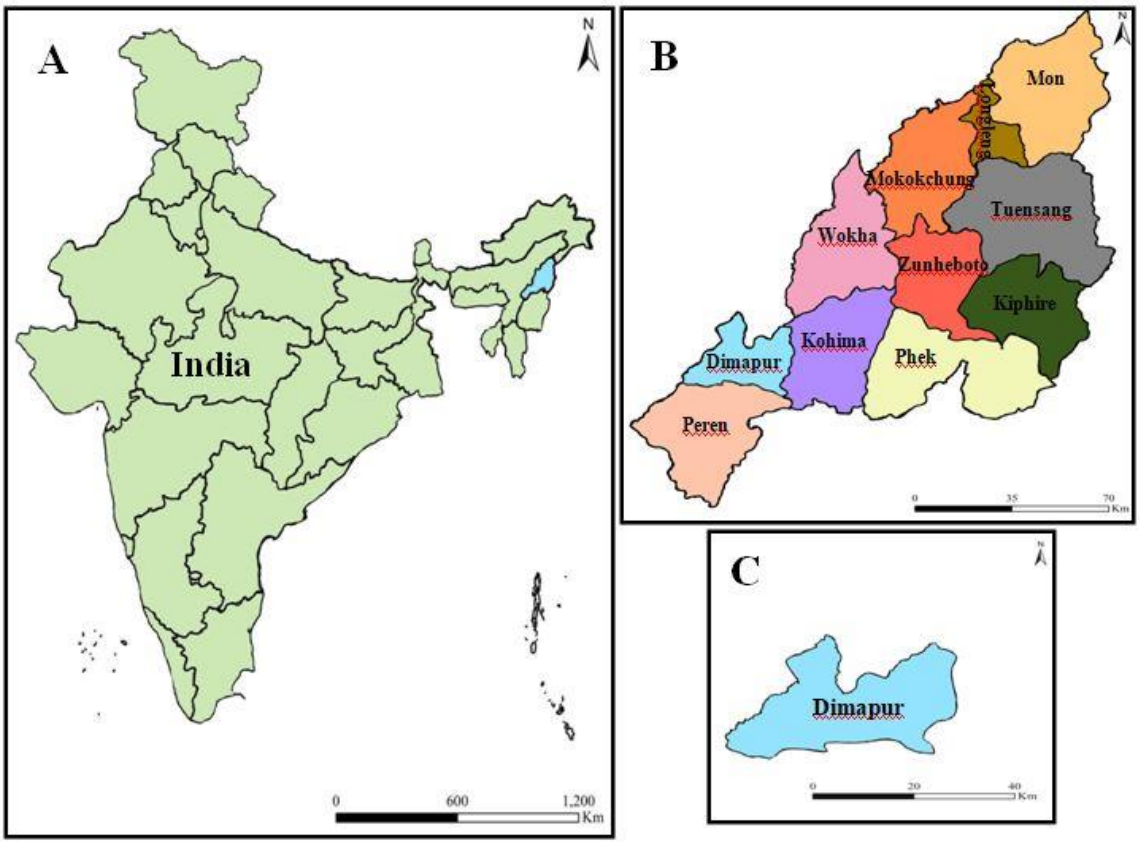
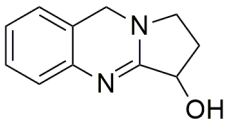
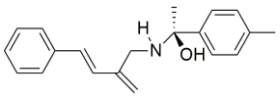
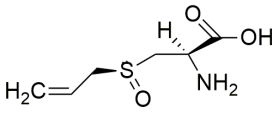
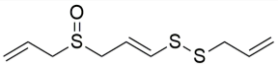
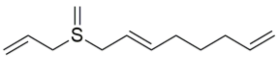
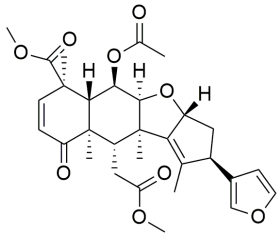
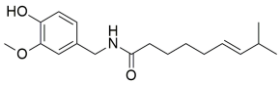
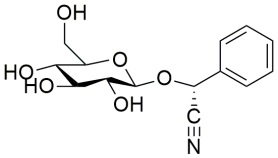


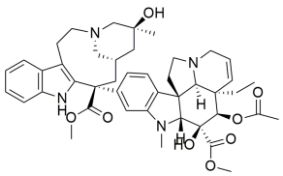
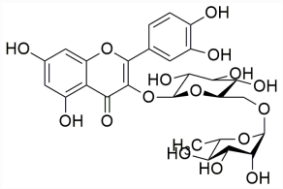
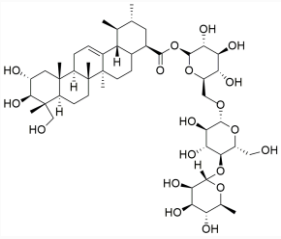
Figure 2. Location map of a) India, b) Nagaland c) Dimapur district.

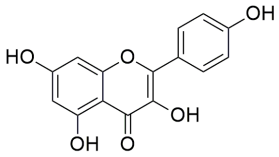
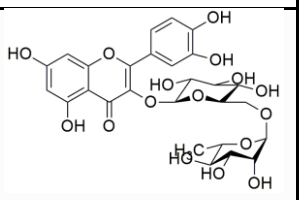
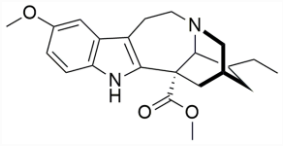
Table 1. List of medicinal plants, its parts and bioactive compound with some medicinal properties

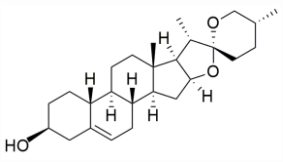
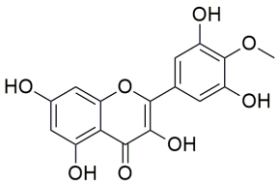
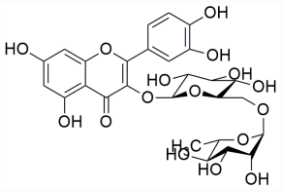
Sr. No	Plant	Family name	Local Name	Part Used	Pharmacological Activity	Bioactive chemical compound & structure
1.	*Adhatoda vasica* (Vasaka)	Acanthaceae	Lepjung (Changkija 1999)	Leaves	Joint pain and lumber pain	 Vasicine (Shahwar et al. 2012) (Ignacimuthu & Shanmugam 2010) (Das et al. 2005)
2.	*Aegle marmelos* (Bengal quince)	Rutaceae	Bel (Jamir et al. 1999)	Dried fruit	Dysentery	 Aegeline (Riyanto et al. 2001) (Manda et al. 2016) (A. Chatterjee 1958) (Gautam et al. 2015) (Nugroho et al. 2011)

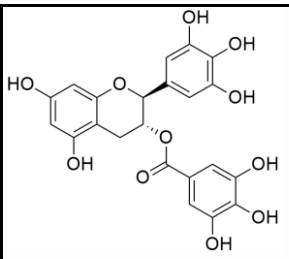
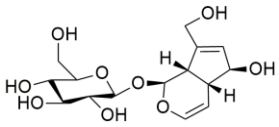
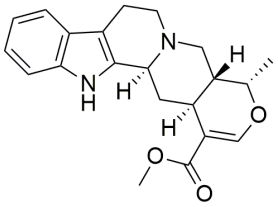
3.	*Allium ascalonicum* (Gandhana)	Liliaceae	Ping (Jamir et al. 1999)	Leaves	Wounds and injury	 Alliin (Gebreyohannes & Gebreyohannes 2013)
4.	*Allium sativum* (Garlic)	Amarylidaceae	Lahsung (Jamir et al. 1999)	Bulbs	Antihypertension	 Ajoene (Ried & Fakler 2014) (Scharfenberg et al. 1990) (Yamada et al. 2006)
5.	*Aloe vera* (Aloe)	Asphodelaceae	Aloe (Jamir et al. 1999)	Leaves	Burnt and wounds	 Anthraquinones (Vázquez et al. 1996) (Choi & Chung 2003) (Tan et al. 2013) (Davis et al. 1986)

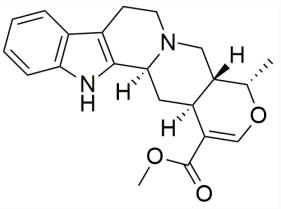
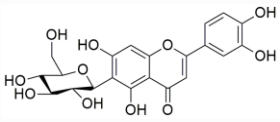
6.	*Azadirachta indica* (Neem)	Melliaceae	Neem (Jamir et al. 1999)	Leaves	Anti-hypertension	 Nimbin (Ghimeray et al. 2009) (Srividya N, Sridevi BP 1998)
7.	*Capsicum frutescens* (chilli)	Solanaceae	Mersu (Jamir et al. 1999)	Fruit	Antipruritic	 Capsaicin (Chaiyasit et al. 2009) (Leete & Louden 1968)
8.	*Carica papaya* (papaya)	Caricaceae	Mamazu (Changkija 1999)	Latex	Antifungal	 Prunasin (Vij & Prashar 2015), (Seigler et al. 2002) (Olafsdottir et al. 2002) (Williams et al. 2013)

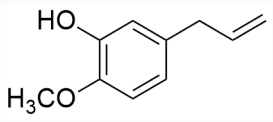
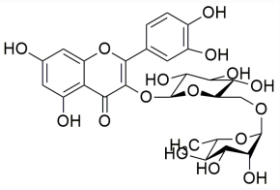
9.	*Catharanthus roseus* (Periwinkle)	Apocynaceae	Tsulinaro (Changkija 1999)	Leaves	Anti-cancer	 Vinblastin (Verma et al. 2007) (Rijhwani & Shanks 1998)
10.	*Caryota urens* (caraw-craw plant)	Arecuceae	Mongrangjangtong (Jamir et al. 1999)	Leaves and nuts	Anti-haemorrhagic	 Rutin (Srivastav et al. 2015) (Arul Ananth et al. 2013)
11.	*Centella asiatica* (Indian pennywort)	Apiaceae	Longsokorok (Changkija 1999)	Whole plant	Diarrhoea	 Asiaticoside (Wijeweera et al. 2006) (Jia & Lu 2008) (Stoeckel 1981)

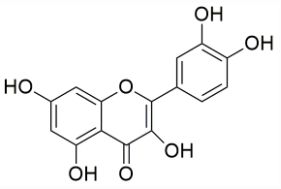
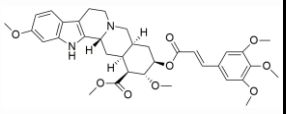
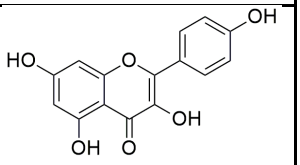
12.	*Clerodendrum colebrookianum*	Lamiaceae	Okemoatong(Changkija 1999)	Leaves	Hypertension And dizziness	 Kaempferol (Doley et al. 2016) (Shrivastava & Patel 2007) (Wang et al. 2017)
13.	*Costus speciosus* (Spiral ginger)	Costaceae	Ako-tenarong-mechapetong (Changkija 1999)	Rhizomes	Rheumatism, inflammations.	 Rutin (Smith Sanjay Jagtap & Satpute 2014) (Vishalakshi Devi & Urooj 2010)
14.	*Colubrina asiatica* (Indian Snake wood)	Rhamnaceae	Khrehuni (S.C Deorani 2007)	Seeds	Anti- addictive	 Voacangine (Brockman 2016)

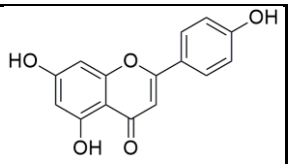
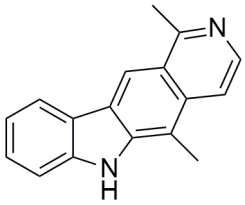
15.	*Dioscorea bulbifera* (air potato)	Dioscoreaceae	Sureshe (Ghosh et al. 2015)	Tuber	Anti-cancer, anti-diabetic.	 Diosgenin (Ghosh et al. 2015)
16.	*Eucalyptus globulus* (Blue gum)	Myrtaceae	Malistong (Jamir et al. 1999)	Leaves and fruits	Scalp Infection, diabetes	 Mearnsetin (Santos et al. 2011)
17.	*Ficus carica* (Fig)	Moraceae	Mongu (Jamir et al. 1999)	Fruits	Intestinal ulcer	 Rutin (Singh et al. 2007) (Del Caro & Piga 2008) (Teixeira et al. 2009) (AlAjmi et al. 2015)

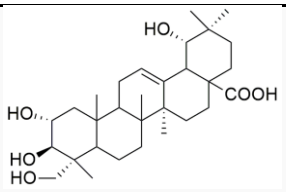
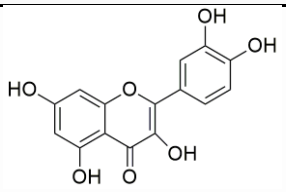
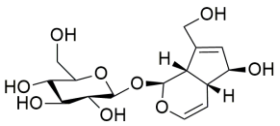
18.	*Musa paradisiaca*(Plantian)	Musaceae	Pokta (Jamir et al. 1999)	Leaves	Diarrhoea, cholera, blood pressure	 Gallocatechingallate (Jawla et al. 2012) (Eleazu et al. 2013) (Loyaga-Castillo et al. 2020)
19.	*Mussaenda frondosa* (Mussaenda)	Rubiaceae	Seirhobie (Changkija 1999)	Roots	Liver disorder and indigestion	 Aucubin (Briggs & Nicholls 1954)
20.	*Mitragyna sp.* (Kratom)	Rubiaceae	Looking (S.C Deorani 2007)	Leaves	Hypertension, blood pressure.	 Ajmalicine (León et al. 2009)

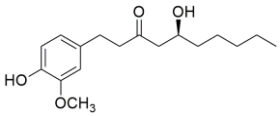
21.	*Paederia foetida* (Striking opal berry)	Rubiaceae	Tsumenumii(Jamir et al. 1999)	Roots	Gastric ulcer, removal of worm, abdominal colic	 Ajmalicine (Knowledge et al. 2020) (Mehrotra et al. 2007)
22.	*Passiflora edulis* (Passion fruit)	Passifloraceae	Entsulashe (Changkija 1999)	Leaves	Dysentery, hypertension	 Isoorientin (Zeraik et al. 2012) (Zeraik & Yariwake 2010) (Deng et al. 2010) (Zeraik et al. 2011) (Cazarin et al. 2015)

23.	*Piper betle* (Betle pepper)	Piperaceae	Patiatua (Changkija 1999)	Leaves	Abdominal spasm and abdominal colic	 Chavibetol (Nikhil Kumar, Pragya Misra, Anuradha Dube, Shailja Bhattacharya 2010) (Dwivedi & Tripathi 2014) (Rekha et al. 2014) (Rimando et al. 1986)
24.	*Polygonum hydropiper* (Water piper)	Polygonaceae	Nikchameri m (Jamir et al. 1999)	Leaves and fruits	Antifungal infection	 Rutin (Shahjabeen Sharif, Tanjida Ahmed, Md. Aminul Haque 2014) (Kostici et al. 2019) (Ayaz 2016)

25.	*Psidium guajava* (Guava)	Mytaceae	Motiram (Jamir et al. 1999)	Leaves	Diarrhoea	 Quercitin (Chambers 2011)
26.	*Rauvolfia serpentina* (Sankeroot)	Apocynaceae	Per mozutong (S.C Deorani 2007)	Dried root	Hypertension, blood pressure	 Rescinnamine (Lemieux et al. 1956)
27.	*Sapindus mukorossi* (Soap nut)	Sapindaceae	Ruhjanjang (Jamir et al. 1999)	Fruits	Antipruritic	 Kaempferol (Pradhan et al. 2015)

28.	*Solanum nigrum* (The black night shade)	Solanaceae	Gadzu (Changkija 1999)	Fruits	Cough and asthma	 Apigenin (Khizar Abbas, Uzma Niaz, Talib Hussain, M.Assif Saeed, Zeeshan Javaid 2014) (Zbidah et al. 2012) (Huang et al. 2010)
29.	*Trachelospermum jasminoides* (Star Jasmine)	Apocynaceae	Mezhagakhwii (S.C Deorani 2007)	Leaves	Malaria	 Olivacine (Le Mée et al. 1998)

30.	*Terminalia bellirica* (Balliric myrobalan)	Combretaceae	Nangkha (Jamir et al. 1999)	Seeds	Antiemetic, cough	 Arjugenin (Kumar & Khurana 2018)
31.	*Urtica ardens* (Stinging nettle)	Urticaceae	Temongstu (Jamir et al. 1999)	Leaves	Constipation, stomach disorder	 Quercitin (Kregiel et al. 2018) (Ibrahim et al. 2018)
32.	*Verbena officinalis* (Vervain)	Verbenaceae	Shunutamtsu(Jamir et al. 1999)	Seeds and leaves	High fever, malaria	 Aucubin (Miraj & Kiani 2016) (Liu et al. 2012)

33.	*Zingiber officinale* (Ginger)	Zingiberaceae	Sungmok (Changkija 1999)	Rhizomes	Cough, common cold, fever.	 Gingerol (Mahady et al. 2003) (Wohlmuth et al. 2005) (Sang et al. 2009) (Funk et al. 2009)