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Ethnomedicinal knowledge on Rai community of Ramprasadrai rural municipality, Bhojpur district, eastern Nepal

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ABSTRACT: In Nepal, about 7000 vascular plants are noted. Some plants are medicinally important, so need to be explore for their medicinal value. Primary data for this research was collected by interviewing respondents. Secondary data was collected by reviewing early published research works on the internet. All herbaria were identified with the help of villagers, books, the internet, and by visiting of National Herbarium and Plant Laboratories (NHPL), Nepal. 35 plant species belonging to 28 families and 35 genera were documented as medicinal plants in the study area. Among these species, more plants were found to be herbs (51%) and the most useful parts were leaves (27%). Throat pain was the most common disease cured by more plant species (8 spp.). The most-used plant species were *Acorus calamus*, *Terminalia chebula*, *Zanthoxylum armatum*, *Swertia chirayita*, *Phyllanthus emblica*, *Ageratina adenophora*, *Drymaria cordata*, *Curcuma caesia*, *Amomum subulatum*, and *Cinnamomum camphora*. The Rai community of this area is rich in knowledge of traditional medicines. Elderly persons are found to be more thinkable about the curative properties of plants, methods of preparation, and diseases diagnosis than young people. Ethnomedicinal knowledge is important for various diseases in the Rai community. Conservation and preserve these plants for future generation as well for the reasons of traditional knowledge is going extinct gradually. The main purpose of this research was to find out the medicinal plants used by the Rai community of Khoksik village in Ramprasadrai Rural Municipality-8 in Bhojpur district.

Keywords: Ailments; Ethnic groups; Herbarium; Medicinal plants; Traditional knowledge.

1. INTRODUCTION

Ethnobotany is the part of science that studies the plant and its practical traditional uses i.e., food, medicine, and shelter. The term defines plant and people relationships (Hershberger 1896) [1]. About 7000 indigenous species of vascular plants are found to be in Nepal, out of which nearly 300 species are endemic [2]. In Nepal, the documentation of medicinal plants starts [3]. Then Manandhar [4] studied the medicinal plants used by the Tamang tribe of Kabhrepalanchok district to treat various ailments, for example *Justicia*

adatoda, *Achyranthes aspera*, *Anaphalis contorra*, *Berberis aristata*, *Castanopsis indica*, *Sida rhombifolia*, *Rubus ellipticus*, *Clerodendrum philippinum* etc. The author documented a total of 95 plant species belonging to 88 genera under 47 families. Furthermore, Manandhar [5] studied herbal drugs of Myagdi district and, documented eighty-one herbal drug species belonging to 51 families and 77 genera. These plants were represented by 3 families of pteridophytes, 3 families of Monocotyledons, and 45 families' dicotyledons such as *Accacia penata*, *Blumea lacera*, *Centella asiatica*, *Dioscorea bulbifora*, *Gallium aparine*, *Rumex hastatus*, *Woodforda fruticosa*, *Zizyphus mauritiana* etc. Medicinal plants of the Jhapa district are used by Meche people for the treatment of different disease [6]. Medicinal plants, including *Cannabis sativa*, *Alternanthera sessilis*, *Sphaeranthus indicus*, etc. are used by Bantar (ethnic groups) of Bhaudaha, Morang district [7]. Kunwar et al. [8] documented 107 species of ethnomedicinal plants in Dolpa, 59 in Humla, 44 in Jumla, and 166 species in Mustang district. In terms of their distribution and folk use, 84 species belonging to 75 genera and 39 families were common. Documented 161 medicinal plants with their curative value belonging to 87 families and 144 genera medicinal plants used by the Magar community of the Gulmi district [9]. Documented a total of 225 species of medicinal plants belonging to 191 genera and 92 families used by the Limbu community of eastern Nepal [10]. In terms of (life form) habit, 100 species were herb, 48 species were trees, 46 species were shrubs, and 25 species were climbers. Similarly, Hawkins et al. [11] recorded the plant species used by each of the 12 ethnic groups of Nepal. Magar [12] recorded 452 plant species of Rolpa district, of which 175 species were ethnobotanical use. In the same way, [13] documented a total of 155 woody plant species from the Manaslu Conservation Area, which were belonged to 103 genera and 54 families. Sigdel et al. [14] studied about habitat ecology of *Ophiocordyceps sinensis* in Western Nepal. They recorded a total of 33 plant species belonging to 16 families associated with caterpillar fungus across the investigated sites. Similarly, Katuwal [15] studied the medicinal plant species used by the Tamang community of Dumre ward of Udayapur district listing 24 species of medicinal plants belonging to 19 families. She had examined (tested) antimicrobial properties of *Clerodendrum viscosum* and *Iresine herbestii*. Bhattarai and Khadka [16] recorded a total of 102 medicinal plant species from Ilam district used to cure at least 56 human ailments. Recently, Das et al. [17] documented total of 60 medicinal plant species belonging to 37 families were reported based on their religious practices and believes in Kewrat people, Biratnagar, eastern Nepal.

Rai is one of the major ethnic group, they speak their specific language. They are mainly found in the hilly regions of the country including Bhojpur, Khotang, Dhankuta, and Sankhuwasabha districts. Most of the Rai people live in traditional houses i.e., houses made up of stone and mud with a thatched roof. Rai is one of the indigenous group in Nepal. Rai communities are using medicinal plants and animal species to cure sicknesses in life [18].

The study of ethnomedicine in the Rai community was found to be started [19] who had documented the names of plants in the Rai language. This is preliminary work in Khoksik village therefore the study has been designed to document the ethnobotanical Knowledge. The main aim of the research is to enumerate the frequently used plants for medicinal purposes in Rai community in Khoksik village in Ramprasadrail rural municipality, Bhojpur district, eastern Nepal.

2. MATERIALS AND METHODS

2.1. Study area

Bhojpur is one of the districts in Nepal which lies in Eastern parts of Nepal. It is placed in the hilly region with an altitude range from 153 m to 4,153 m above sea level [18]. Among seven rural municipalities

in the Bhojpur District of Nepal, Ramprasadrai is one of them. Its name was kept by the name of democratic warrior Ramprasad Rai. It is located at the southern part from headquarter of the district. Ramprasad Rai rural municipality has spread at an area of 156.25 square kilometers. There are about 4,016 households and 18,888 populations [20]. Ramprasadrai municipality is a combination of eight wards including Okhre, Dhodalekhani, Bhulke, Dalgaun, Manebhanjyang, Baikunthe, and Basikhora. The total area of the Bhojpur district is 1507 sq. km. Among them, 10.38% of the land has covered with Ramprasadrai rural municipality.

Major ethnic groups found in the study area are of the Rai community. Among the total population, only about 1% of people are of another caste, but they also follow Rai culture, language, and festivals. In the study area, most of the houses are built with stones, mud, and woods. Dry grasses are used to thatch the roof of houses. The main profession of villagers is farming. They grow crops by using the traditional farming system to fulfill their own needs. No standard hospitals are found here. So most of the patients went to Dhami and Jhakri for treatment and the remaining few peoples only go nearer local health post. The village is placed at the top of the hill. To reach there, we have to walk through a large number of foothills. Due to the hard geographical condition, the village is not well developed yet. So, villagers are not well introduced to western medicine. Until yet, they are using local medicinal plants for various ailments.

2.2. Data collection

Primary data were collected through the interview method. The villagers with age variations were asked questions individually and given information were noted in a notebook. The questionnaire method was followed out for data collection. There were community leaders, local healers, schoolteachers, and other Rai people as key informants. The possible medicines were prepared practically by using the methods taught by local healers. The data related to the study area were taken from the website of Ramprasadrai rural municipality (<http://ramprasadrainun.gov.np/>). And the map of the study area was taken from the village profile of Ramprasadrai rural municipality.

2.3. Herbarium preparation and identification

Collected medicinal plants was deposited in Trichandra Multiple Campus (TU), Kathmandu, Nepal. All plants were placing with voucher number. Local name of all plants was noted from the villages local language and the botanical name and families were identified from different literature, internet, and from expertise.

3. RESULTS

A total of 35 ethnomedicinal plants belonging to 28 families and 35 genera and 35 species were found in the study area. Majority of useful species were herbs (51%, n=18), followed by tree (29%, n=10), and shrub (20%, n=7). The plant species documented from the study area are enlisted below with their scientific name, local name, family, habit, form of medication, and parts used for the treatment of different ailments. 35 listed medicinal plant species belong to 28 families and 35 genera.

Among 35 medicinal plants 18 species were herb, 10 species were trees, and 7 species were shrubs. That means herbs have high medicinal value rather than trees and shrubs. Different parts of medicinal plants were harvested for use. The major forms of medication like chewing, juice, decoction, paste, resin, oil, and rubbing. It also shows that the most common form of medication was chewing followed by juice and decoction (Table 1, Figure 1) that among 35 documented medicinal plants the leaves of 11 plants, roots of 7

plants, fruits of 6 plants, the bark of 4 plants, stem, and seed of 6 plants, and resin, flower, and rhizome of 6 plants were used for medicinal purpose (Figure 2).

Table 1. List of documented medicinal plant species with their application.

Voucher number	Botanical name	Family	Local name	Habit	Ailments	Part used	Mode of administration
14	<i>Achyranthes aspera</i>	Amaranthaceae	Uttanejhar	Herb	Throat pain	Roots	Juice
16	<i>Acorus calamus</i>	Acoraceae	Bojho	Herb	Throat pain, tonsillitis	Rhizome	Chewing
15	<i>Ageratina adenophora</i>	Asteraceae	Banmara	Shrub	Cut wounds	Leaves, young stem	Paste
29	<i>Aloe vera</i>	Aspodelaceae	Ghyukumari	Herb	Normal burns	leaves	Juice
1	<i>Amomum subulatum</i>	Zingiberaceae	Alaichi	Herb	Throat pain, scalding	seed	Herb
5	<i>Artemisia vulgaris</i>	Asteraceae	Titepati	Herbs	Skin disease	Leaves	Paste
4	<i>Artocarpus lakoocha</i>	Moraceae	Badahar	Tree	Mumps	Resin	Resin
3	<i>Asparagus racemous</i>	Asparagaceae	Kurilo	Herb	Lactation	Root	Decoction
2	<i>Belamcanda chinensis</i>	Iridaceae	Tyangpatrae	Herb	Tongue bumps	Root	Chewing
13	<i>Berginia ciliata</i>	Saxifragaceae	Pashanbeda	Herb	Body pain	Leaves	Decoction
20	<i>Cannabis sativa</i>	Cannabaceae	Ganja	Herb	Stomach pain	Leaves, seed	Chewing , juice
28	<i>Centella asiatica</i>	Apiaceae	Ghodtapre	Herb	Throat pain	Leaves	Juice
35	<i>Cinnamom camphora</i>	Lauraceae	Kapoor	Tree	Common cold, throat pain	Seed, fruits	Oil, chewing
34	<i>Citrus limon</i>	Rutaceae	Kagati	Tree	Dry skin problem, throat pain	Fruits	Decoction, chewing
17	<i>Clerodendrum philippinum</i>	Lamiaceae	Banabeele	Herb	Cut wounds	Leaves	Paste
18	<i>Curcuma caesia</i>	Zingiberaceae	Besar	Herb	Tongue bumps	Rhizome	Chewing
22	<i>Cuscuta reflexa</i>	Convolvulaceae	Pahelo lahara	Parasitic herb	Jaundice	Stem, leaf, root	Decoction
24	<i>Desmodium trifolium</i>	Fabaceae	Gaitihare	Herb	Blood pressure, diarrhea	Root	Juice
23	<i>Drymaria cordata</i>	Caryophyllaceae	Abhijalo	Herb	Wildness	Leaves, stem	Juice
21	<i>Inula cappa</i>	Asteraceae	Bhede kaan	Shrub	Throat pain, pneumonia	Root	Juice
26	<i>Juglans regia</i>	Juglandaceae	Okhar	Tree	Dry skin problem	Bark	Paste
19	<i>Momordica balsamina</i>	Cucurbitaceae	Bankarela	Climber, herbaceous	High blood pressure	Fruit	Decoction
27	<i>Osyris wightiana</i>	Santalaceae	Noondhiki	Shrub	Body pain	Root	Decoction
25	<i>Phyllanthus emblica</i>	Phyllanthaceae	Amla	Tree	Diarrhea, dandruff	Bark, fruit	Chewing, paste
12	<i>Psidium guajava</i>	Myrtaceae	Amba	Tree	Stomach pain, Diarrhea	Bark	Juice
10	<i>Punica granatum</i>	Lythraceae	Anar	Tree	Diarrhea	Bark	Juice
11	<i>Rhododendron arboreum</i>	Ericaceae	Laligurans	Tree	Blood pressure, diarrhea	Flower	Chewing

Voucher number	Botanical name	Family	Local name	Habit	Ailments	Part used	Mode of administration
33	<i>Rubus ellipticus</i>	Rosaceae	Aiselu	Shrub	Common cold	Young leaves	Chewing
8	<i>Scutellaria discolor</i>	Lamiaceae	Nilo butte ghans	Herb	Tonsillitis	Root	Chewing
32	<i>Semicarpus anacardium</i>	Ancardiaceae	Thulo Bhalayo	Tree	Dry skin problem	Resin	Resin
7	<i>Smallanthus sonchifoliu</i>	Asteraceae	Bhuisyau	Shrub	Diabetes	Shrub	Decoction, chewing
6	<i>Sweritia chirayita</i>	Gentianaceae	Chiraito	Herb	High blood pressure	Leaves, stem	Decoction, chewing
9	<i>Tagetes minuta</i>	Asteraceae	Saipatri	Shrub	Pneumonia	Flower, leaves	Juice, chewing
30	<i>Terminalia chebula</i>	Combretaceae	Harro	Tree	Throat pain, common cold	Fruit	Chewing
31	<i>Zanthoxylum armatum</i>	Rutaceae	Timur	Shrub	Gastritis	Leaves, fruits	Paste, decoction

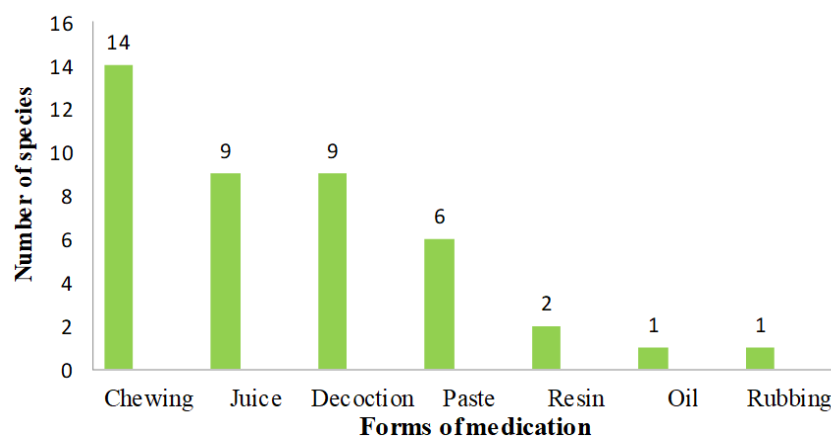


Figure 1. Number of plant species used in different mode of administration of medicinal purpose in Rai community.

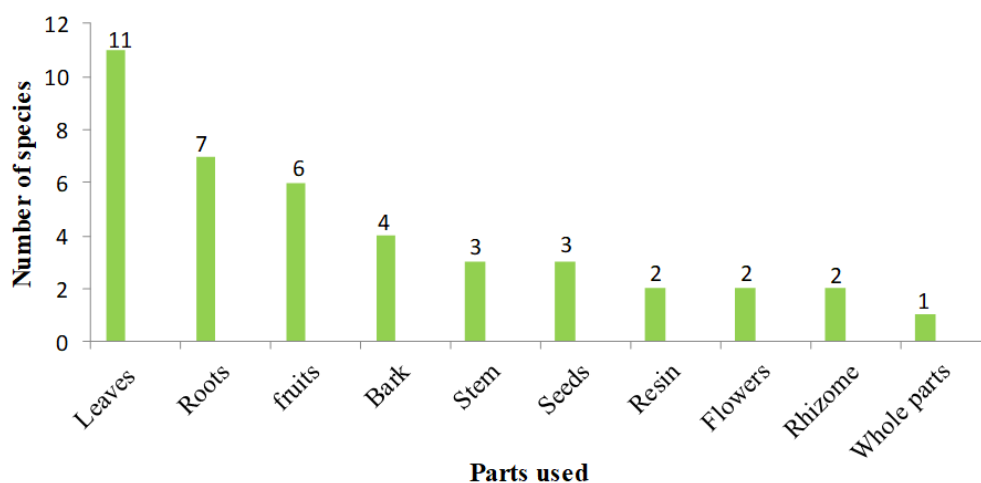


Figure 2. Plant parts used based on field survey.

Majority of species were harvested for leaves (27%), followed by roots (17%), fruits (15%), bark (10%), stem (7%), seeds (7%), resin (5%), flowers (5%), rhizome (5%), and whole part (2%) (Fig. 6). More plant species (8 spp.) were used for throat pain treatment followed by diarrhea (5 sp.). Similarly, Common cold, Dry skin problems, pneumonia were treated with 3 species, and body pain, stomachache, tonsillitis, cut

wounds, blood pressure, and tongue bumps were treated with 2 species, and the remaining 11 disorders were treated with single plant species (Figure 2). More plant species (8 spp.) were used for throat pain treatment followed by diarrhea (5 spp.). Similarly, Common cold, Dry skin problems, pneumonia were treated with 3 species, and body pain, stomachache, tonsillitis, cut wounds, blood pressure, and tongue bumps were treated with 2 species, and the remaining 11 disorders were treated with single plant species.

In the study area, the rhizome of *Acorus calamus*, the fruit of *Terminalia chebula*, the root of *Inula cappa*, the fruit of *Citrus lemon*, the seed of *Amomum subulatum*, the seed of *Cinnamomum camphora*, leaf of *Centella asiatica*, and roots of *Achyranthes aspera* were consumed in the form of juice, decoction, paste, and powder to cure throat pain. In the same way, the flower of *Rhododendron arboreum*, the fruit of *Phyllanthus emblica*, the bark of *Psidium guajava*, the bark of *Punica granatum*, and root of *Desmodium sp.* were used in case of diarrhoea. The seed of *Cinnamomum camphora*, the young stem of *Rubus ellipticus*, and fruit of *Terminalia chebula* were taken during the common cold. Similarly, for the treatment of Pneumonia, the root of *Achyranthes aspera*, the flower of *Tagetes minuta*, and roots of *Inula cappa* were used. The bark of *Juglans regia*, the fruit of *Citrus limon*, and resin of *Semecarpus anacardium* were used in dry skin problems. Similarly, *Artocarpus lakoocha* was useful to treat mumps, *Amomum subulatum* for scalding urine, *Aloe vera* for normal burns, *Asparagus racemosus* for lactation, *Drymaria cordata* for wildness, *Cuscuta reflexa* for jaundice, *Artemisia vulgaris* for skin disease, *Phyllanthus emblica* for dandruff problem, *Cinnamomum camphora* for common cold, *Smallanthus* for diabetes, and *Zanthoxylum armatum* for stritis. Major medicinal plants were used in the study area (Figures 3, 4).



Figure 3. A, *Aloe vera*; B, *Clerodendrum philippinum*; C, *Punica granatum*; D, *Citrus limon*; E, *Juglans regia*; F, *Smallanthus sonchifolius*; G, *Belamcanda chinensis*; H, *Phyllanthus emblica*; I, *Psidium guajava*; J, *Cocconia grandis*; K, *Momordica balsamina*; L, *Swertia chirayita*.

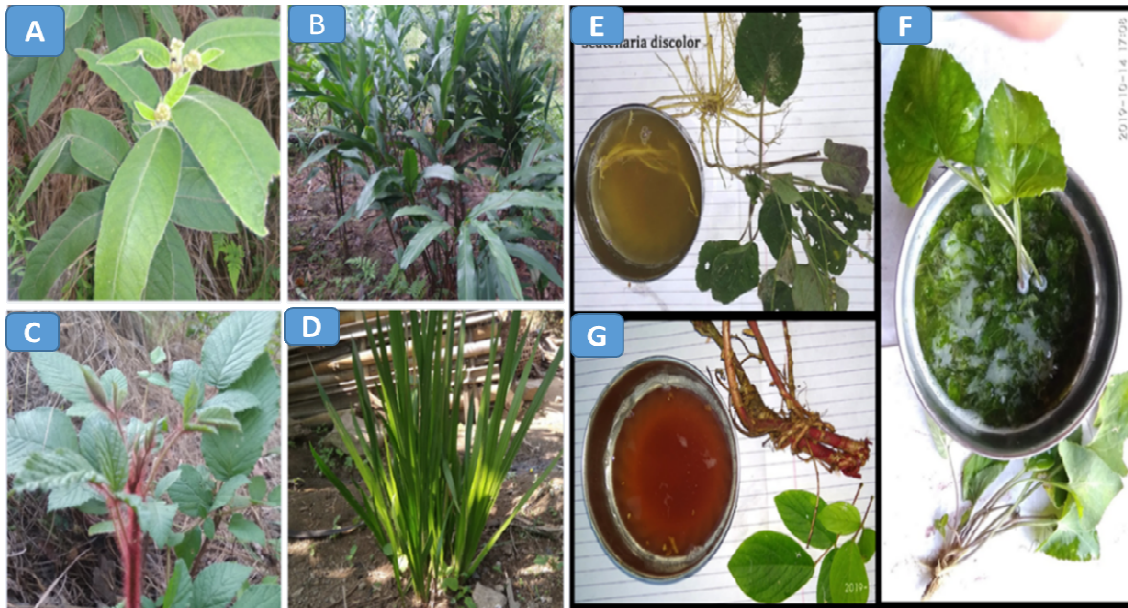


Figure 4. A, *Inula cappa*; B, *Amomum subulatum*; C, *Rubus ellipticus*; D, *Acorus calamus*; E-G, Grinding some medicinal plants juice for the traditional uses on Rai community in Khoksik village.

4. DISCUSSION

Nowadays, the collection of some medicinal plants like *Swertia chirayita* has become difficult than the past because their value is increasing. Unsustainable harvesting and the depletion of forests are also the major causes for the loss of medicinal plants. The dependence of plants alters with out-migration, so, the rate of loss of indigenous knowledge of plants is proportional to the out-migration [21]. Therefore, the tissue culture method for propagation of medicinal plants is important. Here, some botanists have concluded the need for the application of plant tissue culture in the protection of endangered medicinal plants. Wawrosch et.al. [22] studied about micropropagation of *Allium wallichii* (jimmu), which is a threatened medicinal plant in Nepal. They concluded that the natural population of *Allium wallichii* can protect with propagating by applying tissue culture technique Sudha et al. [23] studied the *in vitro* propagation of *Decalepis arayalpathra* which is one of the endangered ethnomedicinal plants. They concluded that direct regeneration of single vigorous shoots using adult nodal explants *Decalepis arayalpathra* is more effective than cotyledonary nodal explants. *Artemisia vulgaris* L., a perennial aromatic shrub with bitter taste, is consider valuable medicinal plant in Nepal [24]. The Ayurveda (homeopathic) health care system depends on the use of these highly valued native medicinal plants [25]. Due to lack of proper conservation strategies, technique, policies, awareness program, poverty, habitat destruction, illegal transport, over exploitation these plants are in state of extinction *A. racemosus* Wild. is also in state of extinction by Paudel et al. [26]. Regarding the value of medicinal plants *Desmodium triflorum* started to the germination behavior of *Desmodium* and conclude that better preservation for the future generation [27]. After that focused to the environmental condition for better preservation [28]. 29 herbs (48%), 12 shrubs (20%), 15 tree (25%) and 4 climbers (7%) were recorded [17]. Again, 25 species are of medicinal value, of which *Valeriana jatamansi*, *Cinnamomum tamala* are threatened due to trade, habitat degradation, and overuse [29]. Furthermore, 32 species were described as their medicinal value with their plant parts from Biratnagar, eastern Nepal [30]. Himalayan regions of Nepal are mainly famous for medicinal plants. Most of the valuable medicinal like *Swertia chirayita*, *Dactylorhiza hatagirea*, *Picrorrhiza kurroa*, and *Paris polyphylla*, etc. grow in the Himalayan regions. People of these regions collect medicinal

plants from forest and sell to increase their household income. Most of the NTFPs (Non timber forest products) are supplied to India. The plant is used for multiple purposes like food, fiber, oil, fuel, resin, medicine, dye, and soaps. Plants are important not because of their various traditional medicinal applications but also perfumery and condiments value. Some plants are also used in spiritual rituals. In simple meaning, plants fulfill our primary needs. We can also extract varieties of phytochemicals from plants. Medicinal plants synthesize useful phytochemicals. Some most famous medicinal plants are *Aloe vera*, *Acorus calamus*, *Artemisia vulgaris*, *Cinnamomum camphora*, *Swertia chirayita*, and *Azadirachta indica*. Not only because of their therapeutic value but also of food and commercial value, plants are beneficial to human beings. Thousands of tons of medicinal plant parts including roots, rhizomes, tubers, fruits, leaves are harvested in Himalaya and traded at national and international levels with an annual value of millions of USD [31]. Himalayan regions of some countries like Nepal are rich in medicinal herb but hardly affected by the problem of overharvesting [32]. According to Mainali [33] traders of Himalayan regions are endangering the population of two threatened medicinal plants *Nardostachys grandiflora* and *Neopicrorhiza scrophulariiflora* that only found at a high altitude of 3500-5000 m.

Some most famous medicinal plants are *Aloe vera*, *Acorus calamus*, *Artemisia vulgaris*, *Cinnamomum camphora*, *Swertia chirayita*, and *Azadirachta indica*. Not only because of their therapeutic value but also of food and commercial value, plants are beneficial to human beings. The plant is used for multiple purposes like food, fiber, oil, fuel, resin, medicine, dye, and soaps. Plants are important not because of their various traditional medicinal applications but also perfumery and condiments value. Some plants are also used in spiritual rituals. In simple meaning, plants fulfill our primary needs can be extract varieties of phytochemicals from plants. Medicinal plants synthesize useful phytochemicals for example *Citrus limon* has anti-bacterial and antioxidant activity [34].

MAPs (Medicinal and aromatic plants) also offer supplementary income and local medicines for many rural people [35]. Mainly, in the Himalayan regions of Nepal, harvesting of medicinal plants is an integrated part of rural livelihood strategies and a major source of household income [36]. Olsen [37] studied about national-level annual volume and value of commercial medicinal plant harvest in Nepal. Olsen [38] studied the collection practice and trade of MAPs from Nepal to Northern India. The author documented that about 35 species of plants are traded from the northern and middle parts of the Gorkha district to India. By reviewing the previous research, it has been found that above 10,000 tons of non-timber forest products (NTFPs) are traded from Nepal to India every year. People of these regions collect medicinal plants from forest and sell to increase their household income. Most of the NTFPs are supplied to India and China for example *Asparagus racemosus* [39].

In the Rai community roots of *Inula cappa* are used to treat throat pain and pneumonia. While in the Newar community decoction of the root of *Inula cappa* is used for the remedy of epilepsy and rheumatism [40]. The present results is also similar which was presented *Cannabis sativa* leaves are used for stomachache [41]. *Zanthoxylum armatum* seeds are used for the treatment of Gastritis while in India, it is used as the remedy of cholera, indigestion, flatulence, and depression [42]. *Swertia chirayita* stems/leaves are used to treat high blood pressure. Joshi and Dhawan [43] reported *Swertia chirayita* as a bitter tonic to treat fever and different skin diseases. *Rubus ellipticus* is used to cure a common cold. This plant is also found to be used for the treatment of skin diseases, wounds, and tumors [44]. The flower of *Rhododendron arboreum* is used as the remedy for blood diarrhea. A similar use of the plant was previously reported [45]. *Osyris wightiana* is used as the remedy of body pain while according to Shyaula [46] it is used for gynecological disorder and cracked

bones. *Phyllanthus emblica* is used for the treatment of diarrhea and dandruff. In India, *Phyllanthus emblica* is widely used for the remedy of diarrhea, jaundice, and inflammation [47]. The bark of *Psidium guajava* is used to cure stomachache and diarrhea. The same plant is used for the remedy of cough, fever, constipation, and bad breath Kumari et al. [48]. *Momordica charantia* is used to reduce blood pressure. According to Kumar and Bhowmik [49] root, fruit, and leaves of *Momordica charantia* are used to treat so many ailments including ulcers, anemia, asthma, and urinary discharges. Juice of *Cuscuta reflexa* is used as the remedy of Jaundice. The similar use of the plant is found in India [50]. *Drymaria cordata* is used to treat wildness. In tropical Africa, *Drymaria cordata* is widely used for the remedy of headache, coryza, bronchitis, and tumors [51]. Fruits of *Citrus lemon* are used as a remedy of Dry skin problem, and throat pain. Chaturvedi et al. [52] documented the use of *Citrus lemon* as a blood purifier, osteoporosis, insomnia, and asthma, etc. Leaves of *Aloe vera* are used to cure Normal burns. According to Kumar and Yadav [53], it has been also used as a remedy of different ailments including fever, gastrointestinal disorders, sexual vitality, and cancer, etc. Common cold and tongue bumps are treated by roots of *Curcuma caesia*. *Curcuma longa* has the potential against diabetes, cancer, allergies, and other diseases [54]. Here documented especially for the rai community used important frequently used medicinal plants; 35 ethnomedicinal plants belonging to 28 families and 35 genera and 35 species were found in the study area. Majority of useful species were herbs (51%) followed by tree (29%), and shrub (20%). 139 plant species belonging to 74 families were found to have ethnobotanical significance among which herbs accounted for 41% followed by trees (29%), shrubs (14%), climbers (9%), grasses (3%), epiphytes (1%), ferns (1%), fungi (1%), and lichens (1%) from Khandadevi and Gokulganga Rural Municipality of Ramechhap District of Nepal [55]. 40 species medicinal plants belonging to 32 families traditionally used by Kisan community of eastern Nepal [56]. Similarly, 108 weed species were recorded under 44 families as medicinal treat different ailments from Kanchanpur district, far-western Nepal [57]. Disorders, viz.: hair fall, dandruff and graying of hair etc. and as hair tonic by Tharu tribe from 46 villages of Devipatan division of U.P. documented 20 medicinally important plant [58]. Furthermore, the most frequent usage was against stomach problems followed by bone and joints cough & cold and fever [59]. From Hindubag Mountain, Lalku valley, District Swat, Pakistan documented 53 medicinal plants of 38 genera, belonging to 25 families [60].

The seeds of *Amomum subulatum* are used as a remedy of throat pain and scalding urine. In ayurvedic and unani medicine, the *Amomum subulatum* is used to cure headaches, inflammation of eyelids, and digestive disorder etc. [61]. The reesin of *Artocarpus lakoocha* is used to cure mumps. Leaves, fruits, and seeds of *Artocarpus lakoocha* are used for fever, an aphrodisiac, and an appetizer [62]. Root decoction of *Asparagus racemosus* is drunk by nursing mother to increase milk secretion. The similar use of the plant was previously reported [63]. *Artemisia vulgaris* leaves are used to treat skin diseases. In Pakistan, the infusion leaves of *Artemisia vulgaris* is widely used for the remedy of fever [64]. The rhizome of *Belamcanda chinensis* is used to cure tongue bumps while in Darjeeling the same plant is used for stomachache, and food poisoning [65]. Seeds and fruits of *Cinnamomum camphora* are used to treat fever, common cold, and throat pain. Different use of *Cinnamomum camphora* i.e. for inflammation, infection, congestion, and irritation, etc. was documented [66]. *Smallanthus sonchifolius* is used as the remedy of diabetes. The similar use of the plant was previously reported [67]. Leaves of *Centella asiatica* are used to cure throat pain. The people of Chakma communities in Bangladesh use juice of *Centella asiatica* as a remedy of syphilis, and ulcer [68]. Leaf extract of *Clerodendrum philippinum* is used to treat cut wounds. While, Florence et al. [69] reported the root and leaf extract of *Clerodendrum philippinum* as a remedy of rheumatism, asthma, and other inflammatory

diseases. Pneumonia is cured by using flowers and leaves of *Tagetes minuta*. This plant is also used as a medicine for colds, respiratory inflammations, and stomach problems [70]. Juice made by the bark of *Punica granatum* is used as the remedy of diarrhea. The similar use of the plant was previously reported [71]. Root juice of *Achyranthes aspera* is used to cure throat pain and pneumonia. In the same way root extract of *Achyranthes aspera* is used as an eye drop for night blindness [72]. The decoction of the *Bergenia ciliata* rhizome is used to relieve body pain. In the same way, the rhizome of *Bergenia ciliata* is used to treat several diseases including fever, cough, diarrhea, and lung diseases [73]. The respondent data showed that majority of the leaves are harvested for the medicinal purpose in Rai community in present study.

The resin of *Semecarpus anacardium* is used as a remedy for dry skin problems i.e., cracked heels. In the same way, the fruits, and nut extract of *Semecarpus anacardium* has various useful properties like anti-reproductive, anti-inflammatory, hypoglycemic, and antioxidant [74]. Bleeding of cut wounds is controlled by applying the leaf extract of *Ageratina adenophora*. This plant leaves also found to have maximum antibacterial activity against tested human pathogens [75]. A root of *Scutellaria dioscolor* is used to treat tonsillitis. Other species of *Scutellaria* like *Scutellaria baicalensis*, *Scutellaria barbata*, etc. are used as a remedy of various diseases including bronchitis, diarrhea, cancer, and liver diseases [76]. Mostly, ethnic groups including Rai, Newar, Tamang, Gurung, and Magar, etc. is found to be close to indigenous knowledge. Traditional knowledge is influenced by ancestry, inter-cultural diffusion, and engagement with the natural environment [11]. Until this age, large numbers of plants are used in Nepal for the production of useful drugs. Singh et al. [77] estimated that in India and Nepal, about 1,500 plant species are used to make about 2,000 drugs. They documented 223 species of medicinal plants from the temperate zone, 124 species from tropical and subtropical zones, and 58 species from alpine and sub-alpine zones of Nepal.

Joshi and Edington [78] recognized that some medicinal plants can be poisonous if consumed by people or domestic animals an insignificant amount. In their work, they listed 66 medicinal plants used by two villages of Nepal. A large number of studies have been done worldwide. Bhat et al. [79] recorded 52 species of medicinal plants from Central Nigeria. According to them, 17 species were used as food, 3 for cosmetics, 1 as an insecticide, and the other for commercial purposes.

5. CONCLUSION

Medicinal plants play an important role in the healthcare system of local communities. It is now important in the field of medical science. The protection, promotion, and utilization of medicinal plants can promote good livelihood. In Nepal, the indigenous or traditional knowledge related to plant use has been found to transfer orally from the older generation to younger generations. But with time, all the primitive knowledge is going to be lost due to the influence of modern medicines which have quick effects with lot of side effects. The treatment done by using traditional knowledge of ethno-medicine is also time-consuming, so all the people are found to be attracted by the fast curative properties of western medicine. Mostly, new generations are found to be more lacking in ethno-medicinal knowledge due to the lack of proper documentation and practice of this knowledge. Rai community of this area is rich in knowledge of traditional medicines. Elderly persons are found to be more knowledgeable about the curative properties of plants, methods of preparation, and disease diagnosis than young people. In the same way, during the herbarium collection, women were found with more information about plant availability places, and collection season. It has been observed that only the older generations know local medicine. The young people are now attracted to urban places in search of opportunities, so traditional knowledge is going to be extinct gradually. Therefore,

medicinal plant-related training and awareness programs are needed for the protection, promotion, and better management of medicinal plants. It is better to preserve the future generation for sustainable use.

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