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RESEARCH PAPER

MEDICAL ETHNOBIOLOGY AND INDIGENOUS KNOWLEDGE SYSTEM FOUND IN DARAI ETHNIC GROUP OF CHITWAN, NEPAL

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ABSTRACT

The present study focuses on traditional usages of animals and plants species for medicinal purpose and indigenous knowledge system existent in Darai ethnic group of Mangalpur VDC, Chitwan, Nepal. A total of 28 animal species and 76 plant species were found to be used by Darai people to treat 22 and 36 different ailments, respectively. Darai people have their own indigenous knowledge for making various bamboo products and fishing equipments and local drink (moat/muna). The existence of knowledge associated with animals and plants and their medicinal utility is currently threatened mainly due to modernization, easy access to health services, lack of interest of youngsters, few local healers and fading of ethnic characters of Darai ethnic group. Thus, documentation of such knowledge has become an urgent need.

Keywords: Darai, Medicinal animals, Medicinal plants, Indigenous knowledge, Local healers

INTRODUCTION

Human beings are directly tied to nature. They use various aspects of nature including animals and plants. The survival of human directly depends on utilization of such resources. Ethnic groups around the globe are found to be close to nature and possess indigenous knowledge regarding sustainable utilization of animals and plants found in their surrounding areas (Maiti & Maiti 2011). According to the World Health Organization (1993), about 80% of the world people rely primarily on animal and plant-based medicines. Ingredients sourced from wild plants and animals are used in traditional medicines, herbal preparations as well as in the preparation of modern medicines (Kang 2003). Thus documentation of such knowledge has become very vital.

Nepal is a small country with immense cultural and natural richness. Dramatic differences in elevation and varied ecological belts running from east to west, vertically intersected by major north to south flowing river system along with different culture support diverse form of livelihood of people (Bhattarai 1992). There are 125 indigenous nationalities in Nepal (CBS 2012). Darai is one of the marginalized ethnic tribes of Nepal. They are mainly found in Chitwan, Tanahu, Gorkha, Palpa, Nawalparasi, Dhading and Makwanpur districts of Nepal. The population of Darai Ethnic group is 16,789 and occupies 0.07 % of inner Terai (CBS 2012). They are honest docile and hardworking people. Bista (1972) mentioned in his book "People of Nepal" that Darai people who live in hot wet and malarial area are reported to have grown immune to malaria. Well known for display of great health, Darai people have traditional way of life and have a close relationship with their local plants and animals. They utilize local plants, wild fruits and vegetables from ancient time for domestic purposes ranging from timber, fiber, medicine, ritual object, etc. These people traditionally acquired diversity of knowledge regarding the utilization of animal resources of the surrounding area.

In the context of Nepal, the ethnobiological study or research is more or less in the stage of void, whereas more ethnobotanical research has been accounted. The first study of a particular community was conducted by Toba (1975) on ethnobotany and village economy, followed by Coburn (1984) and Manandhar (1990). However, Singh (1995) initiated ethnobiological research in Nepal followed by other researches like Upahadaya (1991), Dhakal (1997), Pokhrel (2005) (Mahawar & Jaroli 2008), Dangol (2010) and (Lohani 2011). Few works have been done in Darai group on the medicinal animal and plant products and documented by Dangol and Gurung (1999), Dangol (2010) etc but there is a definite scarcity of such

knowledge when it comes to animal products and indigenous knowledge of Darai ethnic group which is the main objective of this research.

MATERIALS AND METHODS

Study Area

Mangalpur VDC lies in Chitwan district 7 km west from headquarter Bharatpur with Narayani river flowing on northern part. Chitwan district lies in Narayani zone and is located in southwestern corner of Central Development region. It lies in between $27^0$21'45" & $27^0$52'30" N and $83^0$54'45" & $84^0$48' 15" E at an elevation of 244-1945 m. The total area of Chitwan district is 2218 sq km which makes 1.5 % of the total area of Nepal. District boundary is marked by Nawalaparasi district along with Narayani river in west, Makawanpur district in east, Parsa district and Bihar, India in south, Tanahu, Gorkha and Dhading district in north. Headquater of the district is Bharatpur which is 5th largest city of Nepal. Most part lies in Siwalik region (86.5%) followed by Mid-Mountain (12.7%) and Terai (0.8%). Chitwan is one of the richest districts in terms of flora and fauna. Among total land of Chitwan 59.7% of land is occupied by forest and 34.7% land is used for agriculture and grassland. Similarly, only 2.8% of land is shrub land, 17% of total land is barren and 1.1% water bodies (Environment statistic 2008). Predominant vegetation is Sal (*Shorea robusta*) forest, a moist deciduous climax vegetation type of the Terai region. Chitwan district is renowned for one-horned rhinoceros, tiger, gharial crocodile, gaur, wild elephant, four horned antelope, striped hyena, pangolin, gangetic dolphin, monitor lizard, python, etc. Among birds are Bengal florican, giant hornbill, lesser florican, black stork, white stork etc.

Data collection and analysis

Ethnobiological data were gathered from March 15-26, 2014 and August 10-18, 2015 using individual interviews conducted with Key informants (elder people and local healers), group discussion and jungle walk. A sample of 28 resource persons that included local healers (*Dhami/Jhankri*), knowledgeable elder people, community leader, medicinal plant collectors, school teacher as well as youth and local people from the study area were selected in order to fulfill the intended objectives of the present research. Plant and animal species seen during field visit were photographed. Identification of specimens was made with the help of herbarium materials, experts, taxonomic keys and literatures.

Data analysis was carried out with the help of MS excel spreadsheet by making simple calculations. The proportions were determined and pie-charts were drawn.

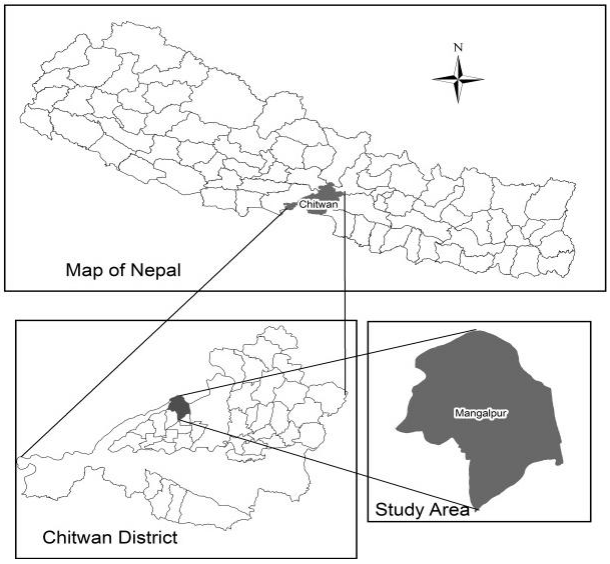

Fig. 1. Map of the study area.

RESULTS

Medicinal ethnobiology

Darai people used various animals and plant species to treat different ailments/diseases which are given in Table 1 and Table 2; respectively (see appendix). The result revealed the use of 28 animal species for treatment of 22 different ailments as shown in Table 1. Among 28 animal species 11 species belonged to class Mammalia, eight to Aves, four to Insecta, two to Reptilia and Mollusca each, and one to Pisces. Sixteen species were wild whereas remaining were domesticated. The study revealed that highest number of animals were used for the treatment of musculo-skeletal diseases (five); followed by integumentary (four); gastrointestinal and otorhino-laryngo (three each); respiratory and reproductive (two each); cardio-vascular, hematological and nervous (one each). Remaining ailments couldn't be classified in medical terms. Likewise various parts/products of animal species were used for medicinal purpose. Meat(flesh) was mostly used (25.64%) followed by egg, fat , bone, body fluid and whole organism (7.72% each); brain and milk (5.13% each). Wax, shelter, carapace, blood, skin and antlers were least used (2.56%).

Different forms of medicine were found to be utilized. Raw being highly used (42.1%), followed by paste (28.94%), cooked (21.05%) and dried, liquor and powder (2.63%). Similarly, different routes of medication of medicinal animals were practiced. Oral absorption was mostly practiced route of medication (43.9%) and is the only source of internal route. Whereas, external medication included apply (17.07%), massage (14.63%), paste (14.64%), amulet (4.88%) and drops (4.88%).

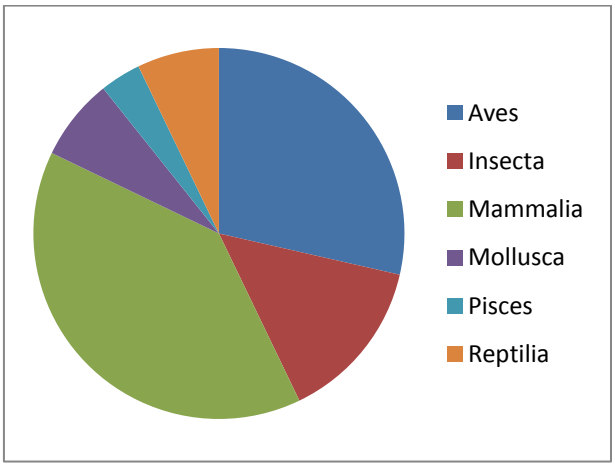

Fig. 2. The number of animals belonging to different classes.

On the other hand 76 species of plant were found to be used by Darai people for the treatment of 36 different ailments among which 23 species were trees, 13 were shrubs, 32 were herbs, 4 were climber, 2 were grass and each one of parasitic herb and creeper (Table 1). The study showed the use in treatment of different types of ailments, with gastrointestinal being commonly treated (9) followed by integumentory and musculo-skeletal, otorhino-laryngo (3each); respiratory (2); reproductive, cardio-vascular, dental, haematolo-gical and genitourinary (1 each). Remaining ailments could not be classified. Medicinal plant species were chiefly used in the form of juice (38.46%) followed by decoction and raw (12.82% each); powder (10.25%); cooked and paste (8.97% each); dried (3.84%) and steamed (1.28%). The commonly used parts/products included leaves (34.78%) followed by root and fruit (15.94% each); flower and whole plant (7.25% each); bark, seed and rhizome (4.43%); stem and tuber (2.89% each). Medicinal plants were administered either externally or internally. External routes of administration included apply (25.64%), massage (3.84%) and drops (2.56) whereas internal routes included oral absorption (64.10%), chewing (2.56%) and inhalation (1.28%).

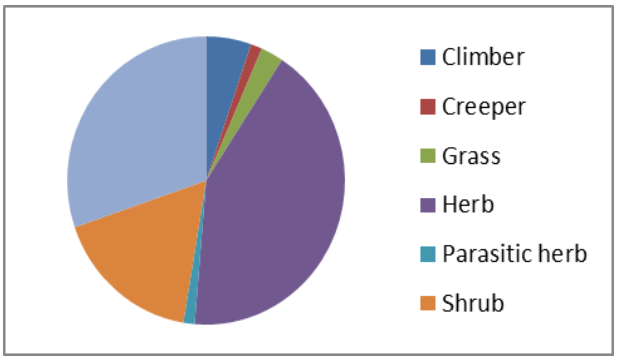

Fig. 3. Life forms of Medicinal plants.

Indigenous knowledge system prevalent in Darai community was also unveiled in the present study which is given below:

- Darai people were found to be rich in knowledge regarding the use of bamboo to make various products like baskets (Doko), craddle (Kokro), fishing basket (Dhadiya) and hat (Topi). Fishing nets and fish poisons were found to be made using plants like *Aconitum* spp.
- Ashes of firewood and compost manure prepared by using cattle urine and leaves of various plants were used to increase fertility of agricultural land and latter being used to treat aphids as well.
- Plants like *Myrica esculenta* (Kafal) *Eclipta prostata* (Bhringijhar) and *Pogostemon benghalensis* (Rudhilo*)* were used to extract natural dyes and colours.
- Alcohol being important parts of lives was made locally. A number of plants used for making *Marcha,* a starter used to prepare local beverages, were *Clerodendrum viscosum* (Bhanti), *Vernonia cinera* (Marchajhar*)* etc. The locally prepared alcohol is called moat/muna.
- Plant like *Ipomoea aquatica* (Karmisag) and animal like *Philaenus spomarius* (Thukekira) were used for lactation enhancement in Darai women.

Natural medicines were made to treat various ailments in domesticated animals Dried leaves of *Cannabis sativa* (Ganja) were fried in Ghee and

fed to livestock to treat cold and abdominal disorder. Paste of *Urtica dioca (Sisnoo)* was applied to the broken legs of cattle and supported by rigid woods for fast recovery. *Bixa orellana* (Simrik) was given orally for speedy recovery. Tubers of Colocasia spp (*Pidalu*) were given to cattle to enhance lactation. Leaves of *Euphorbia hirta* (Pati) were spread in the cage of chicken and duck to treat body lice and mites.

DISCUSSION

Dangol and Gurung (1999), Dangol (2010) carried out studies on Darai people of Chitwan but only documented the medicinal plants used by Darai people. However, in present study medicinal animals and indigenous knowledge system prevalent in Darai community were explored. Findings of this research are supported by previous studies. For example, alcohol of meat of *Canis aurens* for treatment of rheumatism was supported by Dhakal (2004) and Thapa (2008). Similarly, use of honey of *Apis cerana* for curing cough was supported by the research works of Tamang (2003), Koirala (2004) and Thapa (2008). In present study *Anadenus* species was found to treat ringworm and heal fracture which was proven by Thapa (2008). Darai people used honey bee larva as source of protein and testicles of male goat for sexual power. Chalise (2010) has observed similar use as well. The antlers of *Axis axis* were found to be used as traditional bone strengthening in present study which was also reported by Kawtikwar *et al*. (2010).

Terminalia bellirica and *T. chebula* found to be used for treatment of gastritis and abdominal disorder was also supported by Ghimire (1999). *Calotropis gigantean* is used for treating sprain and the similar use has been observed by Ale *et al*. (2009), Dangol (2010) and Rai (2004). *Viscum album*, as in present study was also documented for its use in healing fractures by Coburn (1984). Similarly, *Cuscuta reflexa* and *Saccharum officinarum* were found to be used by Darai community in treatment of jaundice which was also mentioned in various previous researches like IUCN (2004), Thapa (2008), Malla and Chhetri (2009). *Cannabis sativa*, reported to be used to stop bleeding of cuts and wound in present study was also documented by Devkota and Karmacharya (2003) and Watanabe *et al*. (2005). *Mimosa pudica* reported for treatment of gastritis in present study was observed to be used in cuts and wounds by Panthi and Chaudary (2003). *Urtica dioca* used to heal fractures by Darai community was also reported by Rajbhandari (2001). *Euphorbia hirta* used for curing cuts and wounds was also observed by Manandhar (1993), Joshi and Joshi (2007). *Acorus calamus* was reported for treatment of sore-throat in present study. On the contrary its usage for curing tonsilitis was documented by Bhattrai *et al*. (2009) and Hasan *et al*. (2013) while Tamang (2003) reported its use in bronchitis. Likewise plants like *Clerodendrum viscosum* (Bhanti) and *Vernonea cinera* (Marchahar) were reported to be used in making local liquor which was also observed by Dangol (2008).

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APPENDIX

Table 1. Animal species used to treat various ailments/diseases

SN	Order	Family	Scientific name	Local name	Habit	Parts/products used	Name of the ailment/disease treated
1	Hymenoptera	Apidae	*Apis cerana*	Mauri	Domestic	Honey, wax, larva	Cough, cracked skin, weakness
2	Hymenoptera	Ichhneumonidae	*Ichhneumonida Spp*	Kamalkutti	Wild	Shelter	Typhoid
3	Diptera	Muscidae	*Musca Spp*	Mankha	Wild	Larva	Typhoid
4	Hemiptera	Cercopidae	*Philaenus spomarius*	Thukekira	Wild	Whole organism	Lactation enhancer
5	Charadiformes	Charadriidae	*Vanellus indicus*	Huttityau	Wild	Egg	Typhoid
6	Galliformes	Phasanidae	*Gallus gallus*	Kukhura	Wild	Egg, Blood, Meat	Eczema, Menstural disorder, Cold
7	Coraciiformes	Coraciidae	*Coracias benghalensis*	Theuwa	Wild	Feather	Abdominal disorder, Cold
8	Columbiformes	Columbidae	*Columba livia*	Parewa	Domestic	Meat	Menstural disorder, Cold
9	Accipitriformes	Accipitridae	*Gypus Spp*	Giddha	Wild	Bone	Fracture
10	Galliformes	Phasanidae	*Pavo cristata*	Majur	Wild	Bone	Heart pain
11	Passeriformes	Passeridae	*Passer domesticus*	Bhagera	Wild	Meat	Sexual power
12	Anseriformes	Anatidae	*Anas Spp*	Haans	Domestic	Egg	Eczema
13	Artiodactyla	Bovidae	*Bos indicus*	Gai	Domestic	Milk, Ghee	Fracture, Bodyache, Sprain
14	Artiodactyla	Bovidae	*Bos Taurus*	Goru	Domestic	Teeth	Tonsilitis
15	Artiodactyla	Bovidae	*Ovis aries*	Bheda	Domestic	Milk, Urine	Fracture, Earache
16	Artiodactyla	Bovidae	*Bubalus bubalis*	Bhaisi	Domestic	Skin	Good luck
17	Artiodactyla	Bovidae	*Capra Spp*	Bakhra, Boka	Domestic	Meat, Milk, Testicles, Brain	Aphrodosiac, Nervous disorder, Anal infection
18	Artiodactyla	Cervidae	*Axis axis*	Mirga/Harin	Wild	Antlers	Fracture, Bone strengthening, Blurred vision
19	Perrisodactyla	Equidae	*Equus Spp*	Ghoda	Domestic	Urine, Sweat, Hoof	Alcohol addiction, Typhoid
20	Artiodactyla	Suidae	*Sus scrofa*	Sungur	Domestic	Fat	Cracked skin

21	Primates	Homonidae	*Homo sapiens*	Manche		Milk	Eye infection
22	Lagomorpha	Leporidae	*Orgodactylus Spp*	Kharayo	Domestic	Meat	Intestinal pain
23	Carnivora	Canidae	*Canis aurens*	Syal	Wild	Fat, Meat	Rheumatism
24	Perciformes	Channidae	*Channa Spp*	Bhoti	Wild	Fat, Intestine	Cracked skin, Burns
25	Testudines	Testudinade	*Testudo Spp*	Kachuwa	Wild	Carapace	Wounds
26	Squamata	Varanidae	*Varanus Spp*	Sun Gohoro	Wild	Meat	Malaria
27	Opisthophora	Viviparidae	*Bellamya Spp*	Ghogi	Wild	Meat	Malaria
28	Pulmonata	Helicidae	*Anadenus Spp*	Chiplekira	Wild	Whole organism	Fracture, Ringworm

Table 2. Plant species used to treat various ailments/diseases

S.N.	Family	Scientific name	Local name	Life form	Parts/products used	Diseases treated
1	Annonaceae	*Annona squamosa*	Sitafal,sarifa	Tree		
2	Apiaceae	*Carum copticum*	Jwaano	Herb	Seeds	Menstural cramps, Lactaion enhancer
3	Acanthaceae	*Adhatoda vasica*	Asuro	Shrub	Leaves	Cough
4	Acanthaceae	*Rungia parviflora*	Runchejhar	Herb	Whole plant	Cuts and wounds
5	Araceae	*Colocasia esculneta*	Pindalu	Herb	Tuber	Lactaion
6	Acanthaceae	*Barleria cristata*	Bhedekuro	Herb	Root	Anaemia
6	Amaranthaceae	*Achyranthes bidentata*	Datiwan	Herb	Stem	Toothache
7	Amaranthaceae	*Amaranthus spinosus*	Lunde	Herb	Seeds	Labour pain reducer
8	Amaryllidaceae	*Allium sativum*	Lasun	Herb	Tuber	Tonsilitis
9	Arecaceae	*Areca catechu*	Supari	Tree	Fruit	Scars
10	Anacardiaceae	*Mangifera indica*	Aanp	Tree	Bark	Dysentry
10	Apocynaceae	*Rauvofolia serpentine*	Sarpagandha	Shrub	Leaves	Snakebite
11	Apocynaeae	*Apocynaceae*	Gulaichi	Tree	Flower	Fever
12	Apocynaceae	*Holarrhena pubescens*	Dudhkhirra	Tree	Bark	Heat
13	Apocynaceae	*Calotropis gigoneta*	Aank	Shrub	Latex	Fracture, Sprain
14	Araceae	*Acorus calamus*	Bojho	Herb	Rhizome	Diarrhoea, tonsillitis, fever
15	Asteraceae	*Mikenia micarantha*	Banmara	Shrub	Leaves	Cuts and wounds
16	Bixaceae	*Bixa orellana*	Simrik	Tree	Fruit	Fracture
17	Bromeliaceae	*Ananas comosus*	Bhuikatahar	Herb	Root	Heat
18	Caryophyllaceae	*Drymaria cordata*	Abijaalo	Herb	Whole plant	Gastritis
19	Cannabaceae	*Cannabis sativa*	Ganja	Herb	Leaves	Cold

20	Capparaceae	*Crafeiva unilocularis*	Siplikan	Tree	Leaves	Urinary infection
21	Combretaceae	*Terminalia chebula*	Harro	Tree	Fruit	Gastritis
22	Combretaceae	*Terminalia bellirica*	Barro	Tree	Fruit	Gastritis
23	Compositae	*Artemesia indica*	Titepati	Herb	Leaves	Cuts and wounds
24	Compositae	*Eclipta prostate*	Bhringiraj	Herb	Leaves	Cuts and wound
25	Convolvulaceae	*Cuscuta reflexa*	Aakashbeli	Parasitc herb	Whole plant	Jaundice
26	Convolvulaceae	*Ipomoea aquatica*	Karmi sag	Herb	Stem	Lactation
27	Costaceae	*Costus specious*	Bethlauri	Herb	Stem	Joint pain
28	Cucurbitaceae	*Cucurbita maxima*	Farsi	Climber	Fruit	Jaundice
29	Cucurbitaceae	*Cucumis stivus*	Kakro	Creeper	Seeds	Heat
30	Cucurbitaceae	*Trichosanthes dioca*	Parbal	Climber	Fruit	Heat
31	Dipterocapaceae	*Shorea robusta*	Sal	Tree	Resin	Fracture
32	Ericaceae	*Rhododendron arboretum*	Laaligurans	Tree	Flower	Bone prick
33	Euphorbiaceae	*Euphorbia roylena*	Siudi	Shrub	Leaves	Dysetry
34	Euphorbiaceae	*Emblica officinalis*	Aamala	Tree	Leaves	Snakebite
35	Euphorbiaceae	*Euphorbia hirta*	Dudhejhar	Herb	Root	Lactation
36	Euphorbiaceae	*Jatropha curcas*	Sajiwan	Shrub	Stem	Constipation
37	Fabaceae	*Mimosa pudica*	Lajjawati	Herb	Root, flower	Gastritis
38	Gentianaceae	*Swertia nervosa*	Titepati	Herb	Leaves	Cuts and wounds
39	Gramineae	*Saccharum officinarun*	Ukhu	Grass	Stem	Jaundice
40	Hypercaceae	*Hyperiucum cordifolium*	Areli,Areto	Shrub	Bark	Rheumatism
41	Juglandaceae	*Juglans regia*	Okhar	Tree	Fruit	Typhoid
42	Lamiaceae	*Pogosteomon benghalensis*	Rudhilo	Herb	Leaves	Typhoid, sinutisis
43	Lamiaceae	*Ocimum santum*	Tulsi	Herb	Leaves	Tonsilitis
44	Lamiaceae	*Ocimum basilicum*	Babari	Herb	Leaves	Fever
45	Lamiaceae	*Leucas Spp*	Gumpati	Herb	Leaves	Abdominal disorder
46	Loranthaceae	*Viscum album*	Hadchur	Shrub	Whole plant	Fracture
47	Lygodiaceae	*Lygodium japonica*	Janai Lahara	Climber	Leaves	Ringworm
48	Malvaceae	*Bombax ceiba*	Simal	Tree	Root, flower	Measles, Dysentry
49	Meciaceae	*Azadirachta indica*	Neem	Tree	Leaves	Wounds, worms
50	Menispermaceae	*Tinospora sinensis*	Gurjo	Climber	Rhizome	Earache
51	Menispermaceae	*Cissampelos pareira*	Batulpate	Herb	Roots	Cough, Worms
52	Moraceae	*Artrocarpus lakoocha*	Badahar	Tree	Bark	Gastritis
53	Moraceae	*Ficus benghalensis*	Bar	Tree	Leaves	Gastritis

54	Musaceae	*Musa paradisiacal*	Keraa	Herb	Flower	Chest pain
55	Myricaceae	*Myrica esculenta*	Kaaphal	Tree	Fruit	Abdominal pain
56	Myrtaceae	*Psidium guajava*	Ambaa	Tree	Leaves	Diarrhoea
57	Myrtaceae	*Syzygium aromaticum*	Lwang	Tree	Fruit	Tonsilitis
58	Oleaceae	*Nyctanthes arbortristis*	Parijat	Tree	Leaves	Heat
59	Onocleaceae	*Matteuccia struthiopteris*	Neuro	Herb	leaves	Diarrhoea, Blood in stool
60	Oxalidaceae	*Oxalis corniculata*	Chariamilo	Herb	Leaves	Earache
61	Poaceae	*Cynodon dactylon*	Dubo	Grass	Leaves	Hair stuck in neck
62	Poaceae	*Thyranolaena maxima*	Amriso	Shrub	Seeds	Urinary infection, Placenta retention
63	Polygonaceae	*Fagopyrum esculentum*	Fapar	Herb	Seed	Typhoi
64	Rhamnaceae	*Ziziphus mauritiana*	Bayer	Shrub	Fruit	Cough
65	Rutaceae	*Citrus medica*	Bimiro	Tree	Root	Dysentry
66	Rutaceae	*Aegle marmelos*	Bel	Tree	Leaves	Diabetes
68	Solanaceae	*Withania somnifera*	Ashwaganda	Shrub	Leaves	Abdominal disorder
69	Solanaceae	*Solanum capsicoides*	Kantakaari	Shrub	Root	Asthma, Chest pain
70	Solanaceae	*Solanum melongene*	Bhanta	Shrub	Root	Placenta retention
71	Umbelliferae	*Centella asiatica*	Ghortaapre	Herb	Leaves	Jaundice
73	Umbelliferae	*Anethum sowa*	Swoup	Herb	Seed	Lactation enhancer
74	Urticaceae	*Urtica dioica*	Sisno	Herb	Leaves	Blood pressure
75	Xanthorrhoeaceae	*Aloe vera*	Ghiukumari	Herb	Leaves	Burns
76	Zingiberaceae	*Amomum zingiber*	Aduwa	Herb	Rhizome	Cough