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Traditional botanical knowledge (TBK) on the use of medicinal plants in Sikles area, Nepal

Santosh Kumar Rana*[1], Pramod Sen Oli[2] and Hum Kala Rana[3]

[1]*Ethnobotanical Society of Nepal (ESON), 107 Guchcha Marg (MJ Mart 6th floor), Kathmandu, Nepal*
[2]*Oxbridge International College, Mahalaxmisthan, Lagankhel, Kathmandu, Nepal*
[3]*Goldengate International College, Battisputali, Kathmandu, Nepal*

ABSTRACT

The present study documents the Traditional Botanical Knowledge (TBK) on the use of medicinal plants by the people in Sikles area (Kaski, Nepal), mainly focusing on three wards. Sikles is located to the N-E corner of Pokhara at mountain side perched on hillock and is one of the largest and most beautiful villages inhabited by Gurung along with minority of lower caste communities. The field was carried out using the semi-structured questionnaire with 45 informants (two groups i.e. below and above 40 years). The ethno medicinal TBK was also quantitatively analyzed using Relative Frequency Citation (RFC) and Use Value (UV) along with their Pearson Correlation. Our study documented 42 plants species used by the local people to cure 43 different ailments. Majority of the species are single in their respective families. The plant families with more than one medicinal plant species reported were Compositae, Ericaceae, Labiatae, Rosaceae, Urticaceae and Zingiberaceae (each with 2 species). The dominant life form of these plant species were herbs with 24 species followed by shrub (7 sp.) and trees (7 sp.). Out of total, roots of 11 sp. were dominant with maximum use against the diseases followed by leaf (8 sp.), whole plants (8 sp.) etc. The RFC and UV calculated indicate less correlation particularly with the use value of the plants and number of informants responding the use of plants. Thus to preserve TBK on use of medicinal plants, the forthcoming generations must be acquainted with species knowledge and their medicinal values.

Key words: Traditional use, Quantitative ethnobotany, Medicinal plants, Sikles

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INTRODUCTION

Plants have been a source of food and medicine from the beginning of human civilization [12]. The plants used by human to cure illness and to relive the suffering are called the medicinal plants. Medicinal plants are important components in the flora of Nepal. Many of them are exclusively found in the Himalayas. Medicinal plant species are essentially used in two ways: first, major commercial used by prescription or over the counter scale and secondly as traditional medicine which may or may not attract a market price [8]. Traditional use of medicinal plant is widespread in Nepal along with the world. Only 10 % of the plants all over the Hindu-Kush Himalayan region are considered to be medicinal [16]. Still majority of the medicinal plant needs proper documentation [9].

The country supports approximately 7000 species of plants, out of which about 700 are medicinal [5]. Plants of economic importance and medicinal value have been using since time immemorial. People in the rural areas are very much linked to their surrounding vegetation and flora. Majority of the herbal medicine that is being used in Ayurvedic system come from the Himalayan region. The practice of use of medicinal plants in village is based on their experiences. The Nepalese people are more acquainted with large number of medicinal plants called it as “Jadibuti” [3].

A large number of plants can be used to treat a single disease as well as single plant is used to cure different diseases [13]. The same plant possess different parts like root, stem, bark leaves, flower, fruit, etc. for the treatment of diseases. But people may not utilize all those. The medicinal plants were used to cure ailments from ancient time but with the increase in population their importance also increased tremendously.

The people in Sikles area are more traditional and majority of them are Gurung. Mainly, the traditional healers (Shamanic healer) have the knowledge of the use of medicinal plants for the different diseases. Though, people other than traditional healers also have the knowledge of medicinal plants but, they depend upon health posts for treatment. They normally don't use medicinal plant themselves all the time but use as prescribed by the traditional healer. Many of the medicinal plants used come from the highland pastures above Sikles.

The study was carried out in Sikles area (comprising ward no. 7, 8 and 9) of Parche VDC, Kaski district, Gandaki zone of the western development region of Nepal. Sikles (pronounced and spelt as Sik-lis) is located in the North Eastern corner of Pokhara, nestled in the shadow of Annapurna II and Lamjung mountain range and is afforded protection by a holy forest. It is situated in around latitude/longitude of 28.226^0N/84.63^0E and an altitude of 1980m above sea level. The high Himalaya region of this area comprises some medicinally important plants.

Sikles is one of the largest and most beautiful villages inhabited by Gurungs with almost 360 houses and more than 2300 people. The people of this village have been utilizing and managing forest resources in their own way for many generations. They are still unfamiliar with the use of medicinal plants and other NTFPs. Only the traditional healers and other very few people have TBK on the use of medicinal plants.

So, considering the ethical issues on ethnobotanical knowledge and plants collection, the present study focused on TBK of local people on medicinal plants. The main objective of the study is to document TBK on medicinal plants found in the study area. The specific objectives are: To explore and identify traditional use of plants for medicinal purpose; and to analyze recorded ethnobotanical knowledge quantitatively.

MATERIALS AND METHODS

The research work was mainly based on the primary data collected during the field visit as well as the secondary literatures. Semi structured questionnaire were administered to the villagers for surveying purposes. The field work comprised of two approaches i.e. survey technique and inventory technique [4,2]. The survey technique included individuals' interviews and focus group discussion among the local plant users, community members, traditional faith healers and school teachers with the semi structured questionnaires. The inventory technique comprised observation and documentation of their local names, part(s) used purpose of use, etc. with the participation of local people. Major informants were chosen from two ethnic groups i.e. Gurung and lower caste. The informants were selected from only 3 wards (7, 8 and 9) of Parche VDC, due to time constraints and availability of informants.

Due to high importance of medicinal plants, ethical issues were taken under consideration during herbarium specimen collection and surveying/interviewing. Photographs of some species which were easily accessible were taken for identification. The plant species were properly identified using the literatures like Polunin and Stainton, 1984 [4] and cross checking with the herbarium specimen at KATH and TUCH as well as correctly named using Press *et al.*, 2000 [2]. The information collected from the TBK of local people were compiled and analyzed quantitatively.

Quantitative ethno-medicinal data analysis

Relative Frequency Citation (RFC)

This index shows the local importance of each species and it is given by the following formula:

RFC = FC / N (0 < RFC <1) [15]
Where, FC is the number of informants mentioning the use of the species
N is the total number of informants participating in the survey.

Use Value (UV)

The Use Value (UV) demonstrates the relative importance of plants known locally. It is given by the following formula:
UV =Σ**Ui** / N [6]
Where, Ui is the number of uses mentioned by each informant for a given species and N is the total number of informants.

RESULTS AND DISCUSSION

The research work was conducted among 45 male and female populations of two ethnic groups (Gurung and lower caste) categorized as: below 40 and above 40 years (Figure 1). Among two ethnic informants, Gurung above 40 years perceived more TBK on medicinal plants as compared to lower caste of same age group (Figure 1). Whereas, informants of below 40 years perceive very little TBK of both the ethnic groups (Figure 1).

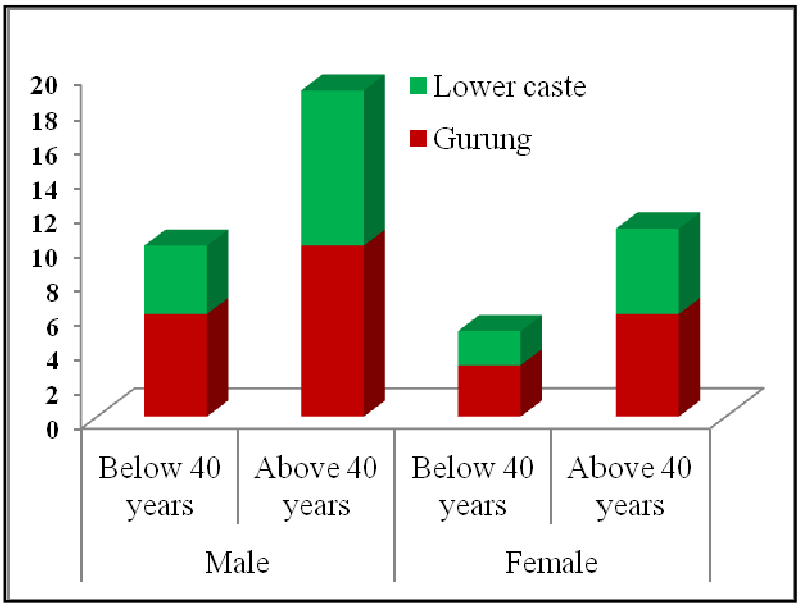

Figure 1: Number of respondent among the Lower caste and Gurung categorized as below and above 40 years

A large number of plants species are found with medicinal value in the Sikles area of Parche VDC. Though the area is rich in medicinal plants, people still depends on health post for medicine. The practice of using medicinal plants is being followed by traditional healers and old generation people. The knowledge that they possess is their traditional knowledge. They were neither trained nor learnt from books. Majority of the informants used them from very past. They use them because other elder people suggest for using the medicinal plants. But, now days the use of medicinal plants is only in minor cases. Rather they prefer to go hospital if they become sick. Some elder people still practices to use these plants for medicinal purposes.

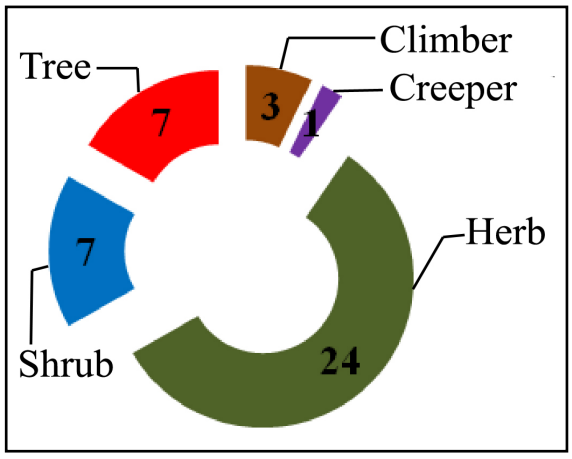

Figure 2: Number of species according to the habit type

The present work documented altogether 42 plant species belonging to 36 families from Sikles area for curing diseases and disorders. Out of 42 species, Pteridophytes (4 sp.) and Angiosperms (38 sp.), including one orchid species (Table 1). Zingiberaceae, Urticaceae, Rosaceae, Labiatae, Ericaceae and Compositae are the families with 2 genera in each and rest with single species in them. The number of plants species used for curing cuts is maximum with 10 sp. followed by wound (8 sp.), cold /cough (6 sp.), stomach pain (5 sp.), skin diseases (5 sp.) etc. (Table 1;

Figure 3). The other diseases which are cured using these medicinal plants include lactation, mental disorder, menstrual disorder, insecticides, dysentery, appetite, etc. The most dominant life form of the medicinal plant species reported includes herbs (24 sp.) followed by shrubs (7 sp.) and trees (7 sp.) (Figure 2).

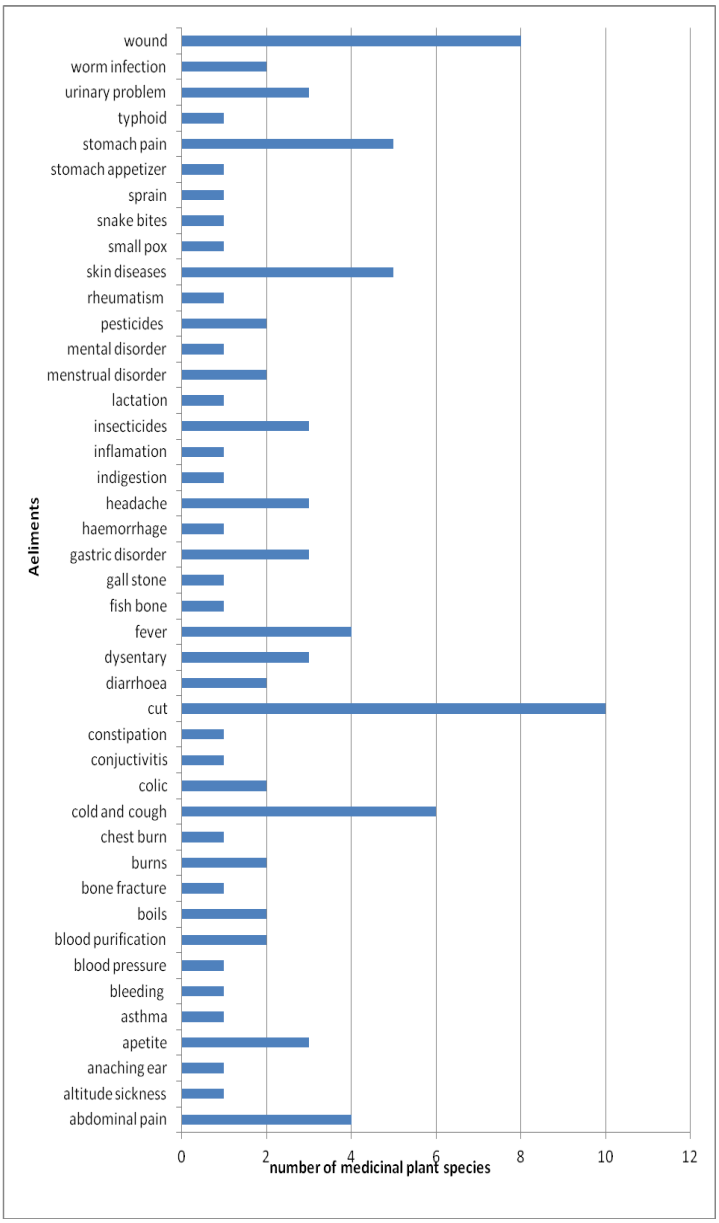

Figure 3: Number of medicinal plants species categorized according to ailments

People from both communities use root parts mainly followed by leaves and whole plants (Table 1). Table 1 shows that *Acorus calamus*, *Cannabis sativa*, *Bergenia ciliata* and *Centella asiatica* are the plant species with higher number of uses as compared to other species which were documented. The wide use of ethnomedicinal plants of families Compositae, Ericaceae, Labiatae, Rosaceae, Urticaceae and Zingiberaceae in the area is due to their wide occurrence with a number of TBK among people. Most of the TBK are related with the use of root, leaves, flower of herbs [1,10,11]. Their uses varied with the diseases and how they have been practiced. The local healers (person with TBK) diagnose ailments by their sign and symptoms rather than specific lab test. Most of the people have utilized their knowledge in medicinal plants for curing cut, wounds, cold and cough, abdominal pains, etc. Such kind of knowledge has travelled through generation to generation. This makes how they perceived in the past. But today's generation is more influence towards medical practitioners. Such TBK are thus decreasing among the informants below age 40 years.

The list of medicinal plants species recorded from Sikles are tabulated in **Table 1**.

Table 1 List of medicinal plants found in Sikles area with their ethnomedicinal use and their Relative Frequency Citation (RFC) and Use Value (UV)

S.N.	Scientific name	Common name	Family	Part (s) used	Habit	Uses	N	FC	RFC	∑ Ui	UV
1	*Aconitum ferox* Wall.ex Ser.	Bikh	Ranunculaceae	R	H	Insecticides	45	15	0.18	1	0.02
2	*Acorus calamus* L.	Bojho	Araceae	Rh	H	Rhizome chewed to obtain relief from cough, colds, and toothache; used to cure diarrhoea and purify the blood. Powder of rhizome used as pesticides and insecticides.	45	38	0.78	7	0.16
3	*Ageratum conyzoides* L.	Ganne	Compositeae	W	H	Leaf paste and juice used in cut	45	30	0.67	1	0.02
4	*Amomum subulatum* Roxb.	Alainchi	Zingiberaceae	S	H	Seeds are taken in stomachic and as aromatic appetizer	45	25	0.44	2	0.04
5	*Ananas comosus* (L.) Merr.	Bhuikatar	Bromeliaceae	F	H	Fruit taken for urinary problem	45	20	0.27	1	0.02
6	*Artemisia dubia* (Wall.) Schott. Wall.ex Besser	Titepati	Compositae	L, St	H	Extracted juice from fresh leaves is applied to treat cut and smallpox; paste is applied, massaged strongly and washed to treat skin diseases.	45	39	0.87	3	0.07
7	*Allium sativum* L.	Lasun	Amaryllidaceae	B, l	H	High blood pressure patient takes raw bulbs. It is also used for high altitudinal sickness	45	38	0.84	2	0.04
8	*Asparagus racemosus* Wild	Kurilo	Liliaceae	R, YS	Cl	Root juice is taken as remedy for stomach pain, colic in cattle. Root paste is mixed with cattle feed to increase lactation.	45	35	0.78	3	0.07
9	*Begonia picta* Sm.	Magar kanche	Begoniaceae	R	H	Root infusion is taken orally to cure constipation	45	31	0.44	1	0.02
10	*Berberis aristata* DC.	Chutro	Berberidaceae	R	S	Decoction of root is taken to kill intestinal worms of human as well as cattle	45	41	0.78	1	0.02
11	*Bergenia ciliata* (Haw) Sternb.	Pakhan bed	Saxifragaceae	Rh	H	Rhizome powder is given to get relief from roundworm. Rhizome is pounded and given to treat swollen stomach in both humans as well as in animal. Decoction pf 50-100 ml of rhizome 2-3 times per day is taken for urinary trouble, gal stone and menstrual disorder.	45	42	0.93	5	0.11
12	*Bombax ceiba*	Simal	Bombacaceae	Ba, R	T	Root paste is used in cut and wounds. Bark powder in gastric disorder and dysentery.	45	38	0.78	4	0.09
13	*Cannabis sativa* L.	Ganja	Cannabaceae	S, Ba, L	H	The crushed plant or powder of the plant is taken to relieve abdominal pain. Plant paste is applied to treat cut and wounds. Leaf paste is given to cattle suffering from diarrhoea and to get relief from swollen stomach pain. Fruits are recommended in case of cold.	45	34	0.76	6	0.13
14	*Centella asiatica* (L.) Urb.	Ghodtapre	Umbelliferae	W	H	Leaf paste is applied in cuts and wounds. Plant paste is applied in snakebites, skin diseases and severe headache	45	29	0.64	5	0.11
15	*Cheilanthes albomoraginata* C.B.Clarke	Ranisinka	Pteridaceae	W	H	Plant powder is taken each morning and evening for three days to treat severe fever. Plant is crushed and filtered and taken to treat dysentery. Juice of the plant is used to treat cuts.	45	18	0.4	3	0.07
16	*Chenopodium album* L.	Bethe	Chenopodiaceae	YS, S	H	Seed powder is used to make bread and take for abdominal pain	45	28	0.62	2	0.04
17	*Cinnamomum tamala* (Buch.-Ham). Nees and Eberm.	Dalchini	Lauraceae	Ba, L	T	Decoction of leaf or bark is used in treatment of fever. Bark is eaten for blood purification and bad odour of mouth.	45	36	0.8	3	0.07
18	*Choerospondias axillaries* (Roxb.)Brutt and Hill.	Lapsi	Anacardiaceze	F, L, Ba	T	Fruits are taken raw for the treatment of menstrual disorder. Leaves cure rheumatism and good for sore throat. Bark is usually in dysentery	45	26	0.58	4	0.09
19	*Colebrookea oppositifolia* Sm.	Dhurselo	Labiatae	R	S	Leaf juice is put into the eye to treat conjunctivitis of cattle. Root juice is given to cure typhoid and leaf hairs are applied to heal wounds.	45	20	0.4	3	0.07
20	*Curcuma angustifolia* Roxb.	Besar	Zingiberaceae	Rh	H	Rhizome paste is applied on the affected part to treat skin diseases. Decoction of rhizome is taken for cough.	45	37	0.82	2	0.04
21	*Cynodon dactylon* (L.) Pers.	Dubo	Gramineae	W	H	Plant juice taken for inflammation of limbs and urinary tracts and gastric disorders. Plant paste is applied to treat haemorrhage.	45	28	0.22	4	0.09
22	*Cynoglossum zeylanicum* (Vahl)Thunb. Ex Lehm	Kanike kuro	Boraginaceae	L	H	Leaf paste is applied in cuts and wounds.	45	18	0.4	2	0.04
23	*Dendrobium amoenum* Wall.ex Lindl.	Hardjorne	Orchidaceae	St	H	Stem is crushed and used in bone fracture of both human and cattle	45	28	0.62	1	0.02
24	*Diplazium maximum* (D. Don).C.Chr.	Niuro	Woodsiaceae	YS	S (fern)	Young shoot are cooked and take for stomach problem.	45	17	0.38	1	0.02
25	*Duchesnia indica* (Andrews) Focke	Bhui kafal	Rosaceae	R	H	Root is fed to treat colic in cattle; used in stomach problem locally known as bikar pareko.	45	20	0.44	2	0.04
26	*Drymaria diandra* Blume	Abijalo	Caryophyllaceae	W	H	Used to treat cold and cough. It is mixed with rice flour and fried in ghee making bread; bread is taken to cure stomach pain locally called ' gano'.	45	21	0.33	4	0.09
27	*Equisetum debile* Roxb.ex Voucher	Akhle jhar	Equisetaceae	W	S (fern)	The plant is crushed and fried in oil and taken to cure the abdominal pain during delivery. The rhizome is burnt in fire and the ash is applied in case of burns.	45	21	0.47	3	0.07
28	*Euphorbia royleana* Boiss.	Siudi	Euphorbiaceae	W	S	Warmed leaf juice is put into an aching ear. Milky latex is used to get relief from boil,	45	20	0.44	4	0.09

						sprains and muscular swellings.					
29	*Ficus auriculata* Lour.	Nimaro	Moraceae	Lt	T	Fruit is given to cure the bleeding of cattle with urine locally called "laumate". Latex is applied to treat cuts and wounds.	45	35	0.64	3	0.07
30	*Girardiana diversifolia* (Link)Friis.	Allo	Urticaceae	R	H	Root juice is taken in gastric disorder and chest burn.	45	41	0.91	2	0.04
31	*Houttuynia cordata* Thunb.	Gandhe	Saururaceae	L	H	Leaves paste is applied in cuts and wounds.	45	16	0.36	2	0.04
32	*Lycopodium clavatum* L.	Nagbeli	Lycopodiaceae	Sp	Cr	Spore powder is applied to burns. It is also taken for headache.	45	16	0.22	2	0.04
33	*Lyonia ovalifolia* (Wall). Drude.	Angeri	Ericaceae	YS	T	Young leaves are applied to skin diseases.	45	23	0.51	1	0.02
34	*Melia azedarach* L.	Bakaino	Meliaceae	Ba	T	Bark powder is taken and made paste with little water and is taken and in case of worm infection. It is also used as insecticides and pesticides	45	20	0.44	3	0.07
35	*Mentha spicata* L.	Pudina	Labiatae	L	H	The pickle is taken to improve appetite	45	29	0.4	1	0.02
36	*Piper mullesua* D.Don	Pahadi pan	Piperaceae	F	Cl	Fruit powder is taken with hot water to treat fever, asthma and cough	45	27	0.24	3	0.07
37	*Rhododendron arboreum* Sm.	Lali gurans	Ericaceae	Fl, BD	T	Bark paste is applied to treat cuts. Flowers are eaten to cure troubles from having fish bone into the neck.	45	40	0.84	2	0.04
38	*Rubus ellipticus* Sm.	Aiselo	Rosaceae	R, YS	S	Watery extract of root is taken orally to treat lower abdominal pain locally called "gano". Young shoot is taken in case of cold and cough.	45	25	0.56	3	0.07
39	*Smilax aspera* L.	Kukurdaino	Smilacaceae	R	Cl	Root paste is used to treat skin diseases	45	22	0.42	1	0.02
40	*Urtica dioca* L.	Sisnu	Urticaceae	R	H	Decoction of root is considered to cure mental disorder, fever and stomach disorder.	45	38	0.84	3	0.07
41	*Viola pilosa* Blume	Ghatta phul	Violaceae	W	H	Leaf paste is applied in boils, wounds.	45	17	0.31	2	0.04
42	*Zanthoxylum armatum* DC.	Timur	Rutaceae	F	S	The fruit is crushed and taken to treat abdominal pain, headache, indigestion and for appetite.	45	28	0.62	4	0.09

*Note: N = total number of informants participating in the survey, FC = the number of informants mentioning the use of the species, **ΣUi = total** number of uses mentioned by each informant for a given species and UV is the use value of the particular species; R=Root, Rh=Rhizome, W=Whole Plant, S=Seed, F=Fruit, L=Leaf, St=Stem, B=Bulb, YS=Young Shoot, Ba=Bark, Lt=Latex, Sp=Spore, Fl=Flower, Bd=Bud; H=Herb, Cl=Climber, S=Shrub, T=Tree, Cr=Creeper.*

Quantitative value indices were calculated to analyze the ethnomedicinal information. *Bergenia ciliata* and *Girardiana diversifolia* are the plants with maximum citation and RFC value 0.93 and 0.91 respectively. These two species are followed by 6 other important species (*Artemisia dubia, Allium sativum, Cinnamomum tamala, Curcuma angustifolia, Rhododendron arboreum* and *Urtica dioca*) which are mostly cited for medicinal values with RFCs > 0.80. *Aconitum ferox* (RFC=0.18) is the least cited species (Table 1). *Acorus calamus* is the most popular medicinal plant with highest UV i.e. 0.16. Besides it, there are 3 other species with the highest UV i.e. > 0.1. They are *Cannabis sativa, Bergenia ciliata* and *Centella asiatica*. Most other species are with very less UV i.e. 0.4 or 0.2.

The informants were the main source providing the TBK that directly links with the use value. The RFC and UV values obtained from the informants in the reported medicinal plants symbolize the degree of TBK shared by various use groups regarding the use of medicinal plants in the treatment of various ailments. Higher the RFC and UV, higher is the trend of utilization of medicinal plants in the area. The higher RFC value (0.93) of *Berginia ciliata* indicates that most of the informants use the particular species. But it doesn't mean that this species have more use value. This species have use value of 0.11. Whereas, very few people possess the TBK of *Aconitum ferox* (RFC=0.18) for the medicinal use. It might be because *B. ciliata* is widely occurred species and *A. ferox* is not much more distributed to be more familiar with the use of species. The Pearson correlation coefficient between RFC and UV was 0.285, indicating less significant association between the local importance of each species and relative importance of use of plants. This implies that increase in the number of informants using the medicinal plants doesn't increases number of the uses of the medicinal plants. Like, *A. ferox* has the single use (i.e., as insecticides) mostly cited by 15 informants of the same use value. Beside this the local people are still lacking the TBK on the medicinal use of the plants as those peoples are more attracted towards drugs medicine. Only few people have TBK especially old people and local healers.

CONCLUSION

Almost 43 diseases are cured by 42 different species. Those diseases are basically cured by either one or many plants. In some cases, many plants are mixed to cure single diseases. Basically the traditional healers use such kind of practices. Mostly used species are *Acorus calamus, Centella asiatica, Urtica dioca, Girardiana diversifolia, Rhododendron arboretum* etc.

Present work basically focuses only on availability of plants in the Sikles area of 3 wards. So, only certain species are documented based on the TBK. Those plant having ethnomedicinal values are to be given more priorities.

In order to emphasize the traditional knowledge and document medicinal plants of Parche VDC of Sikles area, it is highly recommended to make local people acquainted with species and importance of medicinal plants. The conservation, utilization, management, harvesting and preservation approaches are to be done at local level.

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