



## Survey and Ethno-botanical Study of Medicinal Plants of Some Selected Villages of Singay-Lalok Region of Leh (UT Ladakh Region)

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### **Authors' contributions**

This work was carried out in collaboration among all authors. Author SD designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors PG and TS managed the analyses of the study. Author TR managed the literature searches. All authors read and approved the final manuscript.

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### **ABSTRACT**

The paper deals with the ethno-botanical survey and studies of medicinal and aromatic plants of some most remote villages of Singay-Lalok region (Wanla, Ursi, Hanupata, Hinju, Fanji-La, Hanupata, Sisir-La, Photoksar) of Leh district of Union territory of Ladakh. Though the region looks barren and lifeless still it represents a treasure house of diversity of plants with high medicinal, aromatic value and other useful properties like food, fodder, fuel and ritual purposes. Predominant species of these areas are:- *Geranium wallichianum*, *Carum carvi*, *Aconogonom tortuosum*, *Argentina anserina*, *Corydalis stricta*, *Heracleum pinnatum*, *Cicer microphyllum*, *Rosa webbiana*, *Caragana versicolor*, *Artemisia macrocephala*, *Rosa webbiana*, *Hippophae rhamnoides*, *Astragalus tibetanus*, *Thalictrum foliolosum*, *Physcholaina praealta*. The medicinal plants surveyed during tour was widely used in Sowa- Rigpa system of Indian medicine for curing various diseases ailments and it has no side-effects as compare to allopathic medicines. The present paper documents ethno-botanical information of sowa-rigpa traditional medicinal usage by the local people of Singay-Lalok region. Around 54 medicinal plants species botanical name, sowa-rigpa name, sowa-rigpa medicinal use, family, habitat and botanical feature are enumerated in this paper.

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## 1. INTRODUCTION

The geographical region of Ladakh union territory is the highest altitude plateau region in India (much of it being over 3,000 m), incorporating parts of the Himalayan and Karakoram mountain ranges and the upper Indus River valley. The mountain ranges in this region were formed over a period of 45 million years by the folding of the Indian Plate into the stationary landmass of Asia. While the Himalayas were formed from the base material of the Indian plate, the Zaskar Range consists of layers of sediment from the ocean floor, and the Ladakh Range of granite was born of the immense heat generated by the friction between the two plates [1].

The Singay-Lalok region comprises of many villages and each village is located at different altitude and has diverse medicinal plant collection: Hanupata: 3715 m (12188 ft), Wanla: 3146 m (10322 ft), Sisir-La: 4832 m (15853 ft), Photoksar: 4142 m (13589 ft), Hinju: 3720 m (12205 ft), Ursi: 3800 m (12467 ft) Fanji-La 3400 m (11154 ft). It is considered one of the most remote and inaccessible region of Leh district of Union Territory of Ladakh. The vegetation in the area is sparse, discontinuous and scattered, clearly showing the rugged landscape with brown sand and barren rocks, but at the same time is most varied and 54 attractive owing to the dry alpine nature. The vegetation is dominated by coarsely shaped bushes majority of which form spinescent cushions. Stunted forms, twisted and bent nature of stems, succulence, cushiony and matted habits and strong root systems are the characteristic features of the vegetation. Ladakh regions Himalayan region covers roughly 10% of India total land surface and harbors 18,440 species of the flora [2] out of which 1750 species are medicinal [3]. To conserve such a rich biological diversity, 9.2% of its area is under protected area network [4]. Though the indigenous knowledge about medicinal plants usually passed through words of mouths from one generation to the next or their descendants inherit the medico-spiritual manuscripts [5]. Hence, many important species that leads to drug discovery may be lost in absence of proper documentation. Moreover, in the face of the emerging threats of destructive harvesting, habitat destruction and biopiracy (Gadgil, 1996) [6] it becomes imperative to document the valuable indigenous knowledge of these plants. Therefore, this study has been undertaken with

aim of collecting, identifying and recording the details of ethno-medicinal plants along with their Sowa-Rigpa traditional medicine usage by local people. Several explorations have been made in different regions of Ladakh to document the traditional use of plants as food and medicine (Navchoo et al. 1990; Kumar et al. 2009; Murugan et al. 2010; Bhattacharyya et al. 1991).

Sowa-Rigpa derived from Mongolian word "Am-rjay" means superior of all, commonly known as Amchi or Tibetan system of medicine and the practitioner of it is called Amchi. Sowa-Rigpa system of medicine is also the traditional medicine of Tibet, Mongolia, Bhutan, China, Nepal, Bhuriat Republic of Russia and Himalaya region of Himachal Pradesh, Arunachal Pradesh, Darjeeling and Sikkim in India [7]. It was the only healing method during the earlier time, later with much progress and development allopathic medicine was introduced but it cannot replace Sowa-Rigpa in many parts. Every village have an Amchi, it takes several years to become a skillful Amchi. Earlier, it was knowledge passes from father to son or Guru to student and now it can be studied in Institution. Amchis never ask for cost and services, it all depends on the people to present something beside's money like earlier time people offer wheat, barley or help the Amchi family during the time of harvesting the crops, etc [8]. Rgyud-bzi, a fundamental text book of Sowa-Rigpa believed to teach by Buddha outlines a vast knowledge of medicine, basic principle of health and disease, method of diagnose disease and therapeutic approaches. The basic theory of sowa-rigpa is based on the principles of Jung-wa-lna (English- five elements, Sanskrit-Panch-mahabhuta) and Nespagsum (English-three humours, Sanskrit-Tri-dosh) (Gurmet, 2004a).

## 2. MATERIALS AND METHODS

The present survey cum ethno-botanical collection was conducted during the month of August 2020 for 5 days in different villages and passes of Singay-Lalok region of Leh district including Wanla, Ursi, Hinju, Fanji-La, Hanupata, Sisir-La and Photoksar. The ethno-botanical and traditional medicinal usage information was collected by visiting different places and recording the traditional medicinal knowledge and usage of plants through consulting expert Amchis of villages and village elders. The plant specimens were collected and identified with the

help of different books and literature available. Around 54 medicinal and aromatic plants species were collected during the survey cum germplasm collection tour. The collected medicinal specimens were used to prepare herbarium for National Institute of Sowa-Rigpa-Leh. The collected specimens were properly dried and mounted on herbarium sheets.

### 3. RESULTS AND DISCUSSION

In the Indian Himalayan Region (IHR), the use of medicinal plants is still a tradition continued by local people or ethnic communities [4] and traditional medicine systems play an important role in daily health care of poor people. Strong belief in the traditional medicinal system and efficient curative properties are the reasons to prefer traditional medicine over modern medication. Each plant has some medicinal value and all of the informants (100%) use medicinal plants to treat at least some ailments.

Around 54 medicinal plant species are collected based on their ethno-botanical information from different localities of Singay-Lalok region. They belong to 29 families, out of which 2 families belong to gymnosperms and remaining 27 families belong to angiosperms. The angiosperms were further divided into dicots (25 families) and monocots (2 families). Among gymnosperms, one species was belonging to Ephedraceae, while Cupressaceae family has only one species. The remaining species belongs to angiosperms in which Fabaceae, Asteraceae (8 species), Lamiaceae (7 species), Rosaceae, Polygonaceae (3 species), Papaveraceae, Geraniaceae, Ranunculaceae (2 species each), Apiaceae, Euphorbiaceae, Amaranthaceae, Plumbaginaceae, Orchidaceae, Boraginaceae, Alliaceae, Berberidaceae, Brassicaceae, Capparaceae, Campunulaceae, Tamaricaceae, Orobanchaceae, Solanaceae, Caryophyllaceae, Gentianaceae, Elaeagnaceae, Plantaginaceae, Crassulaceae (1 species each). The botanical names, sorig names, family, sorig use and habitat are mentioned in Table 2.

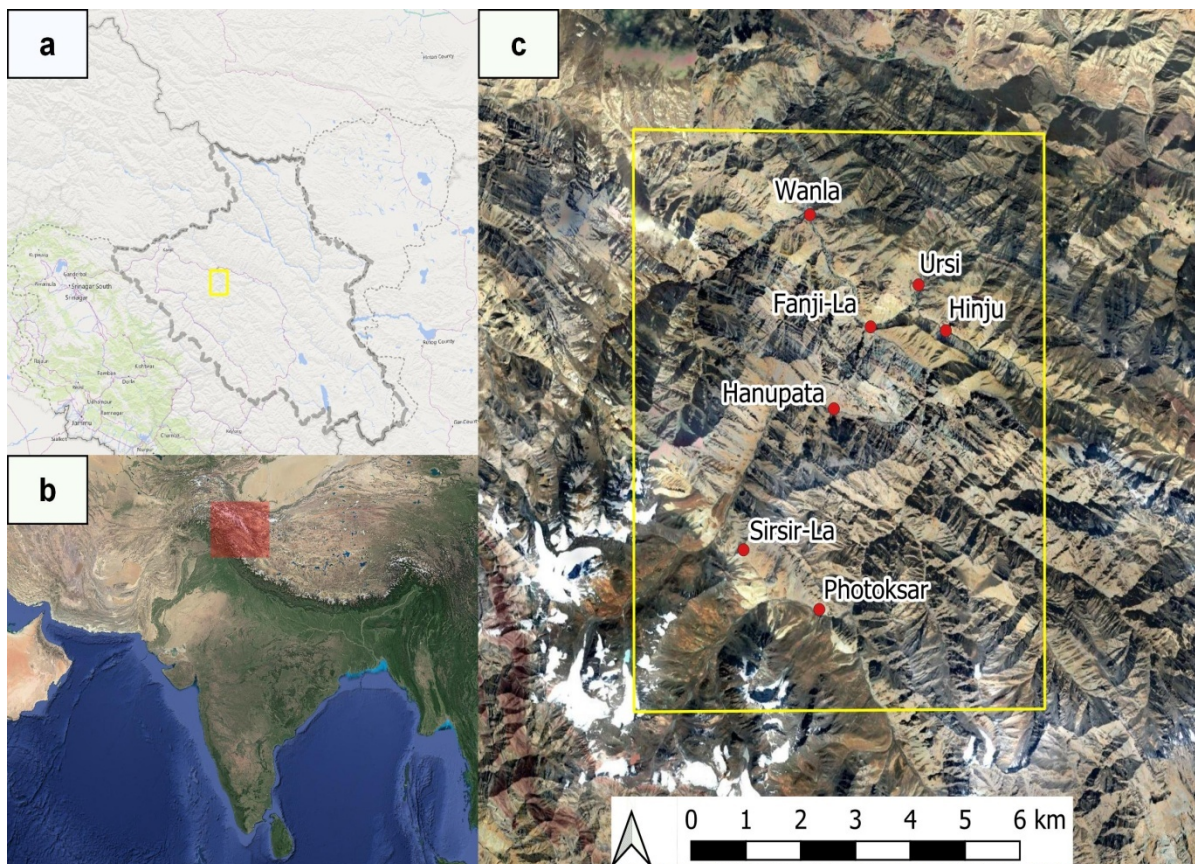


Fig. 1a, b, c. Location map of study area

Singay-Lalok area is largely dependent on village Amchis for their day to day health needs and almost all the villages has their own Amchis. The Singay-Lalok being one of the most remote villages of Ladakh region, remains cut off from the mainland and its lack of modern healthcare facilities. They mainly depend on local healers like amchi for their health care. There are various formulations prepared by resident of communities and local amchis like the young leaves and tender shoots of *Capparis spinosa* were used as fried vegetable by residents of communities. The tender shoots of *Rhodiola imbricate* were rinsed properly in running water and mixed in curd to prepare Tangthoor, a special local recipe with the roots of *Potentilla anserine* were edible and raw. The roots of *Lancea tibetica* and seeds of *Hyocyamus niger* are used by Amchis to treat pulmoary disease. The roots of *Saussurea* sps. were also used by

local Amchis to treat epilepsy and paralysis. Similarly the *Juniperus* sps. locally known as Shukpa used for producing fragrant incense in monastery and local houses and seeds of *Juniperus* used by local Amchis to treat joint pain and throat inflammation. The leaves of *Mentha royleana* were used in preparation of chutneys by locals and occasionally mixed in curd as flavouring component and roots of *Dactylorhiza hatagirea* used by local Amchis to treat kidney disease and increase semen. The aromatic plants like *Carum carvi* and *Allium przewalskianum* used as spice and condiments in local dishes by local people.

The High-altitude Himalayan zone is full of fragile habitats and is rich in native species [9,10]; therefore, presence of large number of native species highlights its conservation priority.

**Table 1. List of medicinal plants collected from different villages during survey as listed below**

S.No.	Village	Altitude (m/ft)	Medicinal Plants
1.	Wanla	3146 m (10322 ft)	<i>Myricaria elegans</i> , <i>Hippophae rhamnoides</i> , <i>Physochlaina praealta</i> ,
2.	Fanji La	3400 m(11154 ft)	<i>Echinops cornigerus</i> , <i>Ephedra regeliana</i> , <i>Mentha royleana</i>
3.	Hinju	3720m (12205ft)	<i>Geranium wallichianum</i> , <i>Carum carvi</i> , <i>Aconogonom tortuosum</i> , <i>Argentina anserine</i> , <i>Corydalis stricta</i> , <i>Heracleum pinnatum</i> , <i>Cicer microphyllum</i> , <i>Artemisia macrocephala</i> , <i>Astragalus tibetanus</i> , <i>Thalictrum foliolosum</i> , <i>Physcholaina praealta</i>
4.	Ursi	3800 m (12467 ft)	<i>Artemisia tournefortiana</i> , <i>Pervoskia abrotanoides</i> , <i>Euphorbia tibetica</i> , <i>Nepeta floccosa</i> , <i>Nepeta discolor</i> , <i>Ribes orientale</i> <i>Allium przewalskianum</i> , <i>Cotoneaster affinis</i> , <i>Corydalis flabellata</i> , <i>Capparis spinosa</i>
5.	Hanupata	3715 m (12188 ft)	<i>Berberis kunawarensis</i> , <i>Arnebia gutata</i> , <i>Dactylorhiza hatagirea</i> , <i>Pedicularis longiflora</i> , <i>Anaphalis virgata</i> , <i>Codonopsis ovate</i> , <i>Oxytropis microphylla</i> , <i>Gentianella moorcroftiana</i> , <i>Ribes orientale</i> , <i>Chesneya cuneata</i> , <i>Dracocephalum heterophyllum</i> , <i>Lancea tibetica</i> , <i>Thermopsis barbata</i> , <i>Artemisia dracunculus</i> , <i>Lactuca tatarica</i> , <i>Rheum speciforme</i> , <i>Myricaria elegans</i> , <i>Hippophae rhamnoides</i> , <i>Rosa webbiana</i> , <i>Lonicera microphylla</i> , <i>Juniperus</i> sps.
6.	Sisir-La and Photoksar	4832 m (15853 ft) and 4142 m (13589 ft)	<i>Delphinium brunonianum</i> , <i>Ajania tibetica</i> , <i>Ephedra geradiana</i> , <i>Saussurea gnaphalodes</i> , <i>Desideria himalayensis</i> , <i>Silene gonosperma</i> , <i>Rhodiola pamiroalaica</i> , <i>Astragalus</i> sps. <i>Caragana versicolor</i> , <i>Thermopsis inflata</i> , <i>Comastoma falcatum</i> , <i>Dracocephalum stamineum</i> , <i>Scutellaria heydei</i> , <i>Acantholimon lycopodiodes</i> , <i>Rhodiola imbricate</i> , <i>Potentilla sojakii</i> , <i>Saussurea obvallata</i> ,

**Table 2. List of medicinal plants with their Sowa-Rigpa usage**

S. no.	Botanical name	Sorig name/local name	Family	Habitat	Sowa-rigpa use
1.	<i>Acantholimon lycopodioides</i>	Long-zay	Plumbaginaceae	Dry stable slopes and rocks	Cardiac disorders
2.	<i>Aconogonom tortuosum</i>	Snya-lo	Polygonaceae	Sandy slopes with stones, unstable loamy slopes, screes	It cures hot disorder present in the vessel organs like small and large intestines, diarrhea, pain in kidney, waist and bottom of the intestine, which occurs after giving birth etc. its boiled decoction cures ascites.
3.	<i>Ajania tibetica</i>	Khampa/ Tibetan tansy	Asteraceae	Stable loam and gravel slopes, moraines, open turf, dry river beds	Nose bleeding, swelling and inflammation of limbs, wounds and renal disorders
4.	<i>Allium przewalskianum</i>	Re-sgog	Alliaceae	Scrub, dry slopes, plains, rock crevices	It improves digestive, stops diarrhea and cures disorder of cold nature.
5.	<i>Anaphalis virgata</i>	Spra-gyung	Asteraceae	Stabilized slopes	It treats contagious diseases, poisoning, glandular diseases, swelling, joint pain and paralysis of limbs [11].
6.	<i>Argentina anserine</i>	Silverweed	Rosaceae	Saline and eutrophicated sites, wet places, roadsides	To treat ulcers, hemorrhoids and act as a analgesic
7.	<i>Arnebia gutata</i>	Demok	Boraginaceae	Sandy deserts and stony slopes	It cures lungs fever, blood vomit, snout bleeding and impure blood.
8.	<i>Artemisia dracunculus</i>	Tshar-bong	Asteraceae	Dry slopes and roadsides	It is useful for pharyngitis, pulmonary diseases and swelling due to hot disorder [11].
9.	<i>Artemisia macrocephala</i> ,	Kaadudavana	Asteraceae	Disturbed habitats on road margins, drier gravel river deposits, synanthropic	It cures bleeding, swelling, renal diseases, wounds, cancer and drains pus from

S. no.	Botanical name	Sorig name/local name	Family	Habitat	Sowa-rigpa use
10.	<i>Artemisia tournefortiana</i>	Khem-mar	Asteraceae	habitats, abandoned fields. A weed in barley fields, wet to mesic loamy river sediments, muddy stream sediments, gravel in river beds, dry watersheds	lungs. anti-inflammatory, anti-febrile, anthelmintic, and antitoxic drugs
11.	<i>Astragalus heydei</i>	Yanglang	Fabaceae	Unstable sands, stabilized slopes	Common cold, upper respiratory problems, arthritis, asthma and blood pressure
12.	<i>Astragalus tibetanus</i>	Tibet milkvetch	Fabaceae	Ditches of irrigation canals, weedy on arable land	Diabetes and boost immune system
13.	<i>Berberis kunawarensis</i>	Skyer-pa-dkar-po	Berberidaceae	Dry slopes, roadsides, and moist forest	It helps to treat red and white discharge, yellow serum, eye ailments, burning sensation in urinary tract, typhoid, diarrhea and dermatological diseases.
14.	<i>Capparis spinosa</i>	Kab-ra	Capparaceae	Disturbed sites along roads and dumps in settlement	Young and delicate leaves are used as vegetable. Flower buds are pickled as flavor and condiment especially for fish. Ripen fruits are either eaten raw or made into pickles. The leaves are considered highly nutritious
15.	<i>Caragana versicolor</i>	Brama	Fabaceae	Dry slopes, dry watersheds	It is useful to treat inflammation of muscles and nerves. It is also used to treat other nerve disorders and can be used as an emetic.
16.	<i>Carum carvi</i>	Go-synod	Apiaceae	Crop field edges, along streams and meadows	It treats fever associated with rLung, poison diseases, ophthalmic diseases, bad-kan disorder and increase

S. no.	Botanical name	Sorig name/local name	Family	Habitat	Sowa-rigpa use
					appetite.
17.	<i>Chesneya cuneata</i>	Jie ye queerdou	Fabaceae	Semideserts, dry slopes, gravel areas	Antiseptic
18.	<i>Cicer microphyllum</i>	Rtsa-mkhres-mchog	Fabaceae	Stabilized slopes, unstable gravel and stony scree	It is used against abscess, swelling of the limbs, poisoning, spleen disorder and colic pain.
19.	<i>Codonopsis ovate</i>	Klu-bdud-rdo-rje	Campanulaceae	Wet alpine meadows, along streams, mountain forests	It cures epilepsy, evil spirits, gout, arthritis, leprosy, swelling, and serum disorder.
20.	<i>Corydalis flabellate</i>	Stong-ri-zil-pa	Papaveraceae	Dry stony areas, semideserts	It is used against proliferation of impure blood, bleeding, wounds and hot disorder associated with blood, liver and gall bladder.
21.	<i>Corydalis stricta</i>	Zhijinghuangjin	Papaveraceae	Dry slopes	It cures the all kinds of hot disorders and epidemic diseases, Especially effective in treating the fever of mKhris pa (bile) disorders, hidden fever and burns etc.
22.	<i>Dactylorhiza hatagirea</i>	Wang-bo-lakpa	Orchidaceae	Mesic grasslands, usually close to water bodies and streams	It provides physical radiance, increases semen and cures kidney disease [12].
23.	<i>Delphinium brunonianum</i>	Bya-rgod-spos	Ranunculaceae	Stony and gravel slopes, both stabilized and unstable	It is used for treating, epidemic fever, poisoning fever, eczema, itching, common cold, evil spirit and developing bile fever [12].
24.	<i>Dracocephalum heterophyllum</i> ,	Jib-rtse-dkar-po	Lamiaceae	Stony and gravel scree, sandy plains, stabilized slopes	It is effective for oral diseases, tooth-ache and fever in liver [13].
25.	<i>Echinops cornigerus</i>	Chang-tser-nag-po	Asteraceae	Sandy deserts and desert,	Leaves help to subside

S. no.	Botanical name	Sorig name/local name	Family	Habitat	Sowa-rigpa use
				unstable sandy slopes	swellings. Roots which are collected in spring bears higher medicinal values for vomiting phlegm (bad-kan).
26.	<i>Ephedra geradiana</i>	Tse-pat	Ephedraceae	Rocks, stony semi-deserts	It treats all kinds of bleeding, cures spleen diseases, mKhris pa disorder, new and chronic fever, wounds, tumors, cough and swelling [13].
27.	<i>Euphorbia tibetica</i>	Tibetan spurge	Euphorbiaceae	Unstable loamy, gravel and sandy slopes, sandy plains, often human disturbed habitats along roads, stony steppes	It cures decomposed wounds removes diseases through purgation and removes bad-kan disorder through vomiting.
28.	<i>Gentianella moorcroftiana</i>	Zangs-tig	Gentianaceae	Dry and mesic slopes, river banks	It cures rLung (wind) accompanied by fever and inflammation of bones etc [12].
29.	<i>Geranium wallichianum</i>	Le-gha-dur	Geraniaceae	Mesic to wet river banks, spring areas, alpine meadows	It treats contagious fever, fever of lungs, fever of channels, poison, swollen limbs and inflammation [13].
30.	<i>Heracleum pinnatum</i>	Tu-dkar	Amaranthaceae	Stony habitats at river banks, stony slopes	It treats swelling, pain, bleeding, abdominal cramps caused by intestinal worms, leprosy, cancer. Its seed is particularly beneficial for Lung disorder [12].
31.	<i>Hippophae rhamnoides</i>	Star-bu	Elaeagnaceae	River gravel deposits, frequently used as fence of private field	It treats pulmonary diseases, blockish blood vessel, blood circulation, gynecological blood tumors, high altitude



S. no.	Botanical name	Sorig name/local name	Family	Habitat	Sowa-rigpa use
					problems and bad-kan disorder [13].
32.	<i>Juniperus</i> sps.	Shuk-pa	Cupressaceae	Dry slopes, river banks	It is used for treating throat inflammation, spleen disorder, uterus disorder, serum in joint and stiffness of limbs.
33.	<i>Lancea tibetica</i>	Spa-yak-rtsa-ba	Plantaginaceae	Wet pastures, grasslands, along streams	Its root helps to heal the lungs and cough. It draws out any formation of pus in the lungs and dries up vitiated blood and chu-ser (serum) caused by the formation of wounds in the lungs. Its leaf cures skin diseases and wounds [14].
34.	<i>Lactuca tatarica</i>	Tsa-mkhres	Asteraceae	Exposed loamy and saline soils, sandy soils along roads	It is useful in treating hot disorder of the gall-bladder, jaundice and headache.
35.	<i>Lonicera microphylla</i>	Phang-ma	Capparaceae	Dry rockyslopes	Its fruit are used to treat heart fever and gynecological diseases.
36.	<i>Mentha royleana</i>	Bye-rug	Lamiaceae	Wet places along streams	It is used for pathogenic diseases in the anus, womb and skin. It has antiseptic action on wounds if applied during summer [15].
37.	<i>Myricaria elegans</i>	Om-bu	Tamaricaceae	River banks, stream sides	It heals various kinds of poisoning, cures yellow serum, blood disorder, cough and compound poisonings.
38.	<i>Nepeta discolor</i>	Se-jing-jie	Lamiaceae	Stabilized slopes, sandy sediments, steppes, exposed	It controls micro-organism both inside and outside of

S. no.	Botanical name	Sorig name/local name	Family	Habitat	Sowa-rigpa use
				rocky slopes, often synanthropic along roads	body, treat bad-kan abscess and ringworm [12].
39.	<i>Nepeta floccose</i>	Wooly catmint/ Shamaloo	Lamiaceae	Unstable loamy and sandy slopes, deserts	Fever, cough & cold
40.	<i>Oxyria digyna</i>	Lug-sho	Polygonaceae	Mesic to wet spring areas and snow beds, along streams	It helps to treat wound infections and pimples [14].
41.	<i>Oxytropis microphylla</i>	Stag-sha	Fabaceae	Semi-deserts, dry stabilized slopes, steppes, sandy plains	It heals wounds, antidote against meat poison, flow nerve channel, stop bleeding, subsides swelling and infectious fever etc.
42.	<i>Pedicularis longiflora</i> ,	Lug-ru-ser-po	Orobanchaceae	Marshes, spring areas, mesic to wet river banks	It treats various kinds of poisoning diseases, urine obstruction, disturbance urination, disturbance breathing, weakness, wounds, epidemic fever, drying lymph fluid and pus etc [14].
43.	<i>Pervoskia abrotanoides</i>	ISKI-ling	Lamiaceae	Dry riverbeds, among large stones	Cough, headache, infection, constipation, & painful urination
44.	<i>Physochlaina praealta</i>	Thang-phrom-nag-po	Solanaceae	Stony deserts, loamy slopes always in dry habitats, weed in barley fields	It heals yellow serum, inflammation in throat, pathogenic diseases and it is also effective against tooth ache [13].
45.	<i>Potentilla sojakii</i>	Rgyu-mkhres-smugpo	Rosaceae	Dry slopes, along streams	It heals common cold, fever, epidemic diseases and poison etc [16].
46.	<i>Rheum speciforme</i>	Chu-tsa	Polygonaceae	Gentle stabilized slopes, gravel areas, barren river	It cures epidemic diseases, indigestion, wounds and

S. no.	Botanical name	Sorig name/local name	Family	Habitat	Sowa-rigpa use
47.	<i>Rhodiola imbricate</i>	Sro-lo-dmar-po	Crassulaceae	beds Scree and stony slopes	flatulence. It treats fever of the lungs and all sorts of new and chronic lungs diseases. The plants are soaked in water for some times and this liquid is used to fight bed breath and also used in medicinal bath to treat dermatological problems.
48.	<i>Ribes orientale</i>	Se-rgod-rigs	Geraniaceae	Stony river terraces, rock crevices	Cortex us useful in treating poisoning, serous fluid diseases, swollen limbs. Fruits are used to treats fever of poison, food poison, hepatitis, fever of gall bladder, epidemic fever etc.
49.	<i>Rosa webbiana</i>	Se-wa	Rosaceae	Stony river terraces, dry stony slopes, rock crevices	It is useful for skin diseases, mKhris pa disorder and immature fever.
50.	<i>Sausssurea obvallata</i>	Za-dug-nag-po	Asteraceae	Scree and unstable gravel slopes and rock crevices	It is effective for epilepsy and paralysis.
51.	<i>Silene gonosperma</i>	Sug-pa	Caryophyllaceae	Unstable slopes, moraines, scree	It treats nasal problems, hearing defects and constipation.
52.	<i>Thalictrum foliolosum</i>	Syno-sprin	Ranunculaceae	Gravel and stony sites, often human-induced habitats, in villages, along stony walls	It heals brown phlegm, stops muscular spasms, unripe fever, diffused fever, intestinal fever and serum disorder.
53.	<i>Thermopsis barbata</i>	Gla-ba-sad-ma	Fabaceae	Dry slopes and roadsides	It cures diseases like skin disorder, pains, inflammation of muscle tissues etc. it also cures swellings. Furthermore,

S. no.	Botanical name	Sorig name/local name	Family	Habitat	Sowa-rigpa use
					it helps to overcome swelling, stenggdon (evil spirits of upper region) and Gzanad (epilepsy) [15].
54.	<i>Thermopsis inflata</i>	Ol-mango	Fabaceae	Unstable loamy slopes, scree	It is used in ascites - to remove water from the body [14].



*Ribes orientale*



*Chesneya cuneata*



*Gentiannella moorcroftiana*



*Dactylorhiza hatagirea*



*Arnebia guttata*



*Acantholimon lycopodioides*



*Caragana versicolor*



*Delphinium brunonianum*



*Nepeta longibracteata*



*Scutellaria heydei*



*Thermopsis inflata*



*Rhodiola pamiroalaica*



*Rheum speciforme*



*Pedicularis longiflora*



*Hippophae rhamnoides*



*Rosa webbiana*

Fig. 2. Pictures of some important medicinal shrubs and herbaceous plants

#### 4. CONCLUSION

The observations and findings made under the present investigation concluded that abundant indigenous knowledge on traditional medicine mainly involving the use of the natural plant resources, still exist and play a significant role in meeting the primary healthcare needs of the tribal people of this cold desert. They use 100% of locally available plant resources to cure various ailments which provide a cheaper and accessible alternative to the high cost pharmaceutical remedies. High dependability and strong belief of the local people on the curable properties of the available plants resources depicts their pharmaceutical potential. Thus, study should be of great use to pharmaceuticals point of view which would provide baseline information for future research and biological resources management.

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#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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