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# Antiviral Potential of Medicinal Plants of Balochistan: Studies Based on the Local Investigations

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## ABSTRACT
Medicinal plants have been extensively used contrary to various infectious and non-infectious maladies world wide. A plethora of medicinal plants of Balochistan region have exhibited potential antiviral activity against a number of infections. Among numerous other ailments, viral infections have denounced the humankind survival, distressing millions of people every year, causing disability and death. A plausible remedy for the viral infections from medicinal plants could be inferred through ethnopharmacological approach.
The purpose of current study is an ethnopharmacological screening for antiviral medicinal plants that are being used traditionally by the local population for different types of viral infections in Pishin and Loralai areas of Balochistan. The study resulted 30 medicinal being used against viral infections in the region.

**Keywords**: Balochistan, Ethanobotany, Indigenous medicinal plants, Virucidals effects.

## 1. INTRODUCTION
There natural products are usually explored by two approaches with respect to their biological activities. The traditional procedure is laboratory oriented and depends upon previous taxonomic findings, immunopharmacological investigations, phytochemical aspects, and random screening techniques. The alternate one is the ethnobotanical route, which is being more acceptable among the researchers, is inspection of the well documented traditional texts, ethnopharmacological applications of the herbs, and local awareness about the medicinal plants from popular native healers[1]. The study of botanicals or "Nature's diverse Combinatorial Library" has a long history as potential pharmaceuticals, and are well rooted in medical practice by ancient practitioners for general therapeutics. During 1981-2002, 61% of all the new drugs recommended globally contain natural products and their derivatives and around 60% of the global community still depends almost entirely on medicinal plants for the primary health care[2]. According to a rational approximation, 25% of the medicines employed generally contain compounds extracted from plant sources and numerous others could present a rich potential reserve for drug discovery for communicable diseases[3]. Being a developing nation of the South Asia, and a country with an area of 87.98 million hectares, Pakistan almost receives more than 80 % of its medicaments from the herbal sources[4]. In indigenous and conventional medicine system, most plants based therapeutics does not produce any adverse side effects in contrast to some chemical or synthetic drugs[5]. A variety of herbal plants have displayed potential for the treatment of numerous viral infections, and some of them have exhibited comprehensive virucidals activity[6]. A viral infection is any type of illness or disease caused by a virus. Most of the human infections are caused by the viruses, among them the common one are acute, short-lived illnesses like colds. Herpes, HIV, hepatitis etc type viruses are never eradicated completely from the body but persist for years in chronic infections[7]. The infections caused by the virus rely upon person's physical condition; various viruses can infect the immune system and leaves the body susceptible to a variety of fatal infections.

Even the common viral infections cannot be treated with antibiotics and are usually defended by the body's own immune system with a slight assistance from appropriate diet, hydration and respite[8]. Through *in vitro* and *in vivo* studies, it has been observed that medicinal plants are the promising source for potential and novel antiviral drugs employed against chronic viral infections such as hepatitis C, as well as for the treatment of viral lesions such as HSV, due to greater efficacy on viral strains and low toxicity to the host[9]. The purpose of this investigation was to identify the indigenous medicinal plants of Balochistan precise region with potential antiviral activities against a diverse group of viruses, as used by the traditional healers and common populace.

## 2. RESULTS AND DISCUSSION
All the plants mentioned in this study are very popular among the various communities of Balochistan and are crucial for the phytotherapy of this region. In general 30 medicinal plant belonging to 24 families have been recorded which are being used for antiviral purposes. A survey of the medicinal plants with their main aspects including chemical constituents, preparation and application parts used are gathered in [Table-1], and the plants species are described in consecutive alphabetical order.

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**Table-1:** Indigenous Antiviral medicinal plants with chemical constituents, preparation and parts used arranged in alphabetic order.

| | Scientific/ Vernacular Name | Family | Parts Used | Viruses | Chemical Constituents | Applications/Antiviral Effect |
|---|---|---|---|---|---|---|
| 1 | ***Allium sativum*** Werznu, Lahsan, Lassan | Alliaceae | Fruit | Influenza, Hepatitis | Allin, allicin, sativin I & II, seordinine, scordine, anthocyanins, glycosides of kaempferol and querection and essential oil. vitamins like thiamine, riboflavin and niacin | The fresh fruit is used in different quantities. Dried fruit of the plant is grounded to make decoction. |
| 2 | ***Althaea Officinalis Linn*** Tukhm-e-khitmi; Gul-e-Khainu | Malvaceae | Leaves, root and flowers | Hepatitis | Mucilage, starch, polysaccharide compounds, seed oil, malvalic acid, fatty oil, butyric acid, phytosterin. | Decoction is made from the roots by boiling them in water. The leaves and flowers are also used to treat different viral ailments. |
| 3 | ***Argyreia Speciosa* sweet** Samundar-sokh | Convolvulaceae | Root and seeds | Influenza | The leaves yields 1-tricontanol, epifriedelinol and $\beta$-sitosterol, quercetin, flavonoids, quercetin kaemperol.The root yields tetradecanyl palminate, scopoletin. The seed yields fatty oil which found to contain the glycerides of palminate, stearic, linoleic, linolenic and oleic acids. | The dried seeds and fruits are grounded along with sugar. |
| 4 | ***Artemisia maritima*** Dron, Tarkha, Kirmala,zoon, Jhan. | Asteraceae | Whole plant. | Hepatitis | Choline, santonin, cineole, insitol, phenol, rutin, succinic acid, artemisifolin, artemisinine. | The entire plant is poached in water and kept in the dark. The pure decoction is used against the Hepatitis. |
| 5 | ***Asparagus racemosus willd***. Shaqaqul; Sat Muli, Satavari | Liliaceae | Young shoots | Hepatitis | Leaves contain quercetin-3-glucoromide, diosgenin, sito- sterol, stigmasterol, sarsapogin, sito-sterol D-glucoside, stigmasteral-B-D-glucoside, two spirostanolic and two furostandic Saponins in root. Sarsapogenin, saponins A4-A7, ghycosides of quercatin, rutin, hyperoside in flower & fruit. | The young shoots are taken and dried to make decoction. The shoots are also dried and grounded and used along with sugar. Tablets are also made and taken orally. |
| 6 | ***Berberis lycium*** Kartoshki, Zarch, Chowenj, Ishkeen | Berberdiaceae | Leaves | Influenza, Varicella zoster (Chicken pox) | Alkaloids barberin barbamine, umbellatine, tannins and starch grains. The fruit contains malic, tartaric, citric acids and tannin. | The decoction of fresh leaves boiled in water is given to the patients thrice a day. |
| 7 | ***Cannabis sativa*** Bhang,Ganja,Thoonchi | Cannabaceae | Stem, leaves and flowering shoots | Influenza | It contains sesquiterpenes, $\Delta^9$-Tetrahydrocannabinol, Myrcene, □ -Pinene, $\alpha$-Terpinolene, Trans- $\beta$-caryophyllene, Trans- $\beta$-ocimene,□□□ Humulene. | Seeds and fresh leaves are used. The seed, either as a paste or as an unguent are helpful The decoction of the root is also made and drunk. The leaf, prepared in various manners. Seeds ground and mixed with porridge given to weaning children |

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| 8 | ***Cichorium intybus*** Kasthi, Kasini | Compositae (Asteraceae) | Whole plant | Hepatitis | *Cichorium intybus* contains taraxerone, □-amyrin, baurenyl acetate and □-sitosterol. Twelve compounds were also obtained from the root of plant including 2, 3, 4, 9-tetrahydro-1H-pyrido-(3, 4-b) indole-3-carboxylic acid. | The green *C. intybus* is steamed with sugar to form the porridge. Then the decoction as a half cup is given to the patients. |
| 9 | ***Crocus sativus*** Zafran, Kesar | Iridaceae | Flowers | Influenza, Hepatitis | Glucoside, crocin, crocetin, picro-crocin essential oil, b and R carotene, lycopene, riboflavin and thiamine. | The flowers of *C. sativus* are boiled in water to make decoction. The flowers are also rinsed in water and then dried. Furthermore syrup is also made locally. It is used against smallpox, pneumonia and for ailments related to the heart and nervous system. It is religiously well known plant. |
| 10 | ***Cydonia oblonga*** Chna, Bigi, Bibi | Rosaceae | Fruits and leaves | Influenza, Varicella zoster (Chicken pox) | The pulp of plant contains quercetin glycoside, rutin (in low amount), caffeoylquinic acids (3-, 4-, and 5-O caffeoylquinic acids and 3, 5 dicaffeoylquinic acid) and the plant also contain Amygdalin, ascorbic acid, carotene gum, mucilage, N-paraffins, Rutin, ß-sitosterol, tannin, tartaric acid, thiamine. | The fresh plant (fruits and leaves) are saturated in water and used before the lunch for persistent cough and stomach ulcer. |
| 11 | ***Glycyrrhiza glabra L*** Moyu, Mulathi | Fabaceae | Whole plant | Influenza | Triterpenoids saponin glycosides, glycyrrhizinic acid, glycyrrhizn, potassiumn & calcium salts of glycyrrhetinic acid. Steroid estrogen (possibly esteriol) and a haemolytically active saponin | Whole plant is boiled in water to make decoction and drunk. It is used against flue, caught and ulcers. |
| 12 | ***Hyoscyamus niger*** Bazarbhang | Solanaceae | Leaves and flowers | Influenza | Maine constituents are Atropine, hyoscyamine, hyoscypikrin and scopolamine with little atropine, hyoscypikrin. | A decoction is made basically from leaves and flowers to treat different ailments that are viral. |
| 13 | ***Hyssopus officinalis*** Zufa, zufa-yabis | Lamiaceae | Aerial part | Influenza, Hepatitis | Carotene, choline, Diosmin, essential oil, fats, flavonoid glycosides, glycosides, iodine, mucilage, resins, sugar, tannic acid, tannin. Essential oils contain □-Pinene, bicyclic sesquiterpenes, camphene, ketone l-pinocamphone and ß-Pinenes. | The aerial parts of *H. officinalis* are grided to make decoction and syrup. |

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| 14 | ***Malva sylvestris Linn*** Gulkhair, Khubazi | Euphorbiaceae | Leaves, root, flowers. | Influenza, Hepatitis | Anthocyanin, Ascorbic ccid, bitter principle, calcium, carotene, flavonal glycosides, malvin A mineral, mucilage, ß-sitosterol, tannin, vitamin A, vitamin B1 and vitamin B2. Leaves contain Tannin. | Decoction is made from the seeds of plant by boiling them in water. This decoction is Demulcent, Diuretic, Emollient, Expectorant and also used against flue and coughing. |
| 15 | ***Morus alba*** Kitoria, Tut, Tul | Moraceae | Fruit | Influenza, Varicella zoster (Chicken pox) | Carotene, ascorbic acid, glutathione, vitamin D, copper, calcium,iron, boron, manganese, zinc, volatile oil, tannins, thiamine, riboflavin, nicotinic acid, drying oil, penta hydroxyflavone. | Fresh fruits are crushed to make the syrup. The patient is treated by conferring one cup of the syrup twice a day. |
| 16 | ***Onosma bracteatum*** Gaozaban, Lisan al-Thawr | Boraginaceae | whole herb | Influenza | The main constituents of *O. bracteatum* are Retronecine, alumina, iron traces, lime traces and silica. | Whole herb is boiled to make decoction and used against different viral ailments like flue, coughing, pneumonia, and headache. |
| 17 | ***Oxalis corniculata*** Miaradian | Oxalidaceae | Leaves | Influenza, Hepatitis | Vitamin C, carotene, malic, tartaric and citric acids (stem, leaves), C-glycosyl flavonoids, 5,7,4¢-trihydroxy-8-C-b-D-glucopyranosides (vitexin), 5,7,4¢-trihydroxy-6-C-b-D-glucopyranoside (isovitexin) and vitexin-2¢¢--O-b-Dglucopyranoside (leaves). | Green leaves are mashed and blended in water to make the syrup. The liquid is given to the patient twice a day. |
| 18 | ***Papaver somniferum*** Poust, Afim | Papaveraceae | Seeds, fruits. | Influenza | Albumin, berberine, codeine, morphine, narceine, narcotine, papaverine, pectins, Resins, and thebaine, laudanine and protopine. | The air-dried milky latex from unripened capsule and also seeds are used for different diseases. The dried fruit is also boiled in water to make a decoction and syrup is also made and drunk. Its action is well reputed in coughing, lungs and other diseases |
| 19 | ***Phyllanthus amarus*** Amli | Euphorbiaceae | Leaves | Hepatitis | Diarylbutane, phyllanthin, aryltetrahydronaphthalene, hypophyllanthin, phyllanthusiin D3, amariin4, amarulone5, amarinic acid, norsecurinine, sobubbialine, epibubbialine, diarylbutane, nyrphyllin 6 and phyllnirurin. | The plant material is rinsed in water and dried at room temperature for two weeks. The dried plant sample is ground into powder. The powder obtained is then used to prepare the extracts. |
| 20 | ***Phyllanthus emblica*** Amla, Amlaki, Nellikai | Euphorbiaceae | Fruit | Influenza | Alanine, glumatic acid, aspartic acid, proline, lysine, minerals, protein, fat, carbohydrates fibers | Dry fruit of *P. emblica* and seeds of *P. granatum* are crushed jointly along with sugar |

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| | | | | | and niacin. | and are suspended in one cup of water and used orally. |
| 21 | ***Plantago Ovata.*** Isapghul, Bazre-katina, Bartang | Plantaginaceae | Seeds | Influenza | Seeds contain mucilage. It also contains xylose, arabinose, galaecturonic acid, rhanos, galactose, albumine, tannine and acetylene. The seeds pulp contains lilonic acid and stable oils. | Two small spoon of fruit or seeds husk are saturated in water to prepare the decoction. This syrup is mixed with sugar and used on the daily basis before the breakfast |
| 22 | ***Prunus domestica L*** Aalu bukhara | Rosaceae | Fruit. | Influenza, Hepatitis (HBV) | D-mannose, D-glactose, D-xylose, L-arabinose, L-rhamnose, glucuronic acid, flavonoid, kaempferol, dihydroka empferol, kaempferide and prudomesti. | Dried fruit of *P. domestica* is saturated in water for over night. The individual is treated by conferring the decoction for two to three weeks. |
| 23 | ***Punica granatum*** Dalum, Anar | Punicaceae | Fruit, Seeds | Influenza | Mannitol, sorbitol, isoquercetrin, citric acid, pelletierine, $\beta$-sitosterol, friedelin, D-mannitol, estrone, fructose, glucose, maltose, sucrose, and oxalic acid. | Dried fruit of *P. granatum* is crushed along with sugar. The residue in three teaspoons are suspended in a cup of water and used orally. The syrup of *Punica granatum* is also used. |
| 24 | ***Rumex sp*** Chirkonzu, Churki | Polygonaceae | Leaves | Influenza, Hepatitis | Ascorbic acid, calcium oxalate, lapathin, rumicin and tannin. | Fresh leaves are crushed in water in the presence of sugar. A cup of this decoction is given to the suffering one. |
| 25 | ***Sisymbrium irio L.*** Khelikheli | Brassicaceae | whole herb | Influenza, Hepatitis | Isorhamnetin, fatty acids, proteins, oil, 24-mrthylene, cholesterol. | The whole herb is boiled in water to make a decoction. The syrup of this plant is also used against different viral and other diseases. |
| 26 | ***Taraxacum officinale*** Shantha, Dulal. | Compositae | Rhizome | Influenza | Taraxacerine, taraxacin, choline, cerylalcohol, lactuce-roltaraxacin, tannin, inulin, etereal oil, vitamin C, xanthophylls, vitamin A and potassium. | Parched rhizomes are steamed with sugar to form the decoction. One cup of this extract is taken before the breakfast. |
| 27 | ***Trachyspermum ammi*** Ajwan | Apiaceae | Fruits | Influenza Varicella zoster (Chicken pox) | Carvacrol, flavone, saponins, tannin, and thymol are the active constituents of *T. amm.i* | Dry seeds of the plant are crushed to powder and dissolved in milk, after the filtration this fed is then given to babies. The fruits are also boiled to make decoction and syrup to treat viral and other diseases like flue, cough, constipation and pneumonia. |
| 28 | ***Viola sp.*** Punar, Banafsha | Violaceae | whole herb | Influenza | Glycosides, alkaloid voiline, viola gum, methyl salicylate, quercitrin, mucilage, saponin and sugar | The whole herb is boiled in water to make a decoction. The syrup of this plant is used against the flue, cough and influenza. |

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| 29 | ***Withania somnifera*** Asgand, Ashwagandha, asana | Solanaceae | Shoots and roots. | Influenza | Somniferin, Somniferinine, Somnine, Tannin, Visamine, Withaferine A, Withananine, Withanine.the leaves also contain 3-Alpha-Tigloxytropine Anaferine, Anahygrine and Choline. | The dried roots are the main portion of the plant used therapeutically. Fruit and seeds are also soaked in water at night and taken the extract early in the morning. |
| 30 | ***Zingiber officinale*** Adrak | Zingiberaceae | Fruit | Influenza, Varicella zoster (Chicken pox) | 6-Gingesulfonic acid, □-Curcumene, □-zingiberene, borneol, geranial, gingerol and ß-sesquiphellandrene. | Mainly the fruit of *Z. officinale* is used. The fruit is dried and grounded to make decoction and syrup and applied to the patient. |

## 3. CONCLUSION

In the current study, thirty medicinal plant species from Loralai and Pishin regions of Balochistan used to treat viral diseases were described and reported The utilization of these medicinal plants to medicate various viral ailments is still needed by the rural communities of Balochistan, owing to poor socio-economic conditions, soaring cost and a difficult access to allopathic medication. Most of the accounted species are uncommon and wild. In the present context, preservation of conventional knowledge is seriously threatened by various factors correlated to modernization of the region and lack of cooperation from the native healers in delivering it to next generation. It is, therefore, imperative to put away the cultural tradition of the natives, by authenticating the practice with scientific paradigm. In this perspective, efforts should be made for the screening of active constituents from the medicinal plants and examining their activities against various viral infections affecting human populace.

## 4. MATERIALS AND METHODS

The current investigations are focused on the traditional use of medicinal plants to treat viral infections. The study was carried out by interviewing respondents in Loralai and Pishin districts of Balochistan. The key respondents were the knowledgeable persons including local practitioners, old aged women and common men that posses prior knowledge on the therapeutic applications of medicinal plants for indigenous healing practice including viral infections. For the systematic collection of data from the respondents regarding the treatment of viral infections, the ethno botanical interviews were conducted. The study contained queries that mark the traditional names of medicinal plants and their parts utilized, preparation methods and applications. The study revealed in 205 informants that included 112 male, 71 female, and 22 native healers. All the informants confirmed their consent to contribute in study.The research employed interviews that covered the name and age of the person, area/village, time of the account, common names of medicinal herbs, herbal part being utilized, preparation system, purpose of practice, habitat type and evaluation of conservation status. The accumulated information was also cross checked in various vicinities from native informants either by viewing the plant specimen or expressing local names to the informants to confirm the validity of claims. The existing literature on the biological activity of these therapeutic plants was also scrutinized so as to ensure the potency and validity of therapeutic uses highlighted by the native population of the focused area, so as to ascertain possible validation between the real life usage and existing data on these plants [10]. The data concerning the chemical composition of these plants described in the current study was collected from the relevant sources (Table 1)[11-14]. Plants material compiled in the current investigation was collected in the herbaria of the university and was identified by the author with the help of available literature [15] and herbarium of BUITEMS Quetta, Pakistan.

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