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# Ethnobotanical Uses of Plants for Covid-19 and other Diseases in District Panjgoor, Balochistan

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## ABSTRACT

An ethnobotanical survey was conducted in District Panjgur, Balochistan, to document medicinal plants used by locals, including remedies for COVID-19. This is the first quantitative ethnobotanical study in the region. A total of 113 informants (81 women, 32 men, including 6 healers) aged 25–70 were interviewed through semi-structured questionnaires. The study recorded 72 medicinal plant species from 37 families, used to treat 62 different ailments, grouped into 14 categories. The most common treatments were for gastrointestinal issues (30 species) and respiratory disorders (15 species). Asteraceae and Lamiaceae were the most represented families, each with 7 species. Leaves (36%) were the most frequently used plant part, and decoction (34%) was the most common preparation method. The plant *Dodonaea viscosa* had the highest use value (0.5), while *Trichodesma africanum* had the highest relative frequency citation (0.42). *Rhazya stricta* had the highest use report (UR7), and urogenital disorders had the highest informant consensus factor (ICF 0.6). Five plants had 100% fidelity level: *Calotropis procera*, *Citrullus colocynthis*, *Plantago ovata*, *Punica granatum*, and *Trichodesma africanum.* This study highlights the rich medicinal plant knowledge in Panjgur and the need to document and preserve this valuable tradition, as it may be lost in the future. Further research is necessary to explore the full extent of traditional knowledge in the region.

## 1. Introduction

Human beings are the only creature of Allah Almighty who prepare and utilize different remedies from plants and other living organism such as insect and animals for the treatment of various ailments. Ethnobotany perform chief role in counting a bond among biological diversity, community and cultural activities (Husain et al., 2008). The ethnobotanical studies include utilization of plants in different aspects such as medicines, clothes, construction materials, food, paper and cosmetics etc. Additionally Ethnobotany is inherently a connection with indigenous people and their communicative, civil, religious and moral with the plants. The diversion of ethnobotanist consists a large-scale of things such as aboriginal curative plant drugs, plant utilized in religious practices, cultural actions and musical apparatus, for food, alternate form of energy etc. Ethnobotanical studies are one of the most productive and successful ways to disclose the wellbeing of plants including food constituents (Silalahi, 2020). Further it has been reported that the result from ethnobotanical studies is a source of basic information for sustainable use and conservation of biological resources (Amusa et al., 2010).

Plant medicines are considered to have significant role in the basic healthcare for mankind and in under developed countries the residents suggest that plant medicines are far safer than synthesized medicines (Sheldon et al., 1997). In folk therapeutic system herbal medicine play a very crucial role in several countries as people get more benefits from the herbal medicine further more these herbal plant are abundant source of various latest medicines. The traditional medicinal system is severely rooted in our communities and this knowledge about the traditional herbal remedies is transmitted generation after generation (Majid et al., 2015). Due to the immense use vales and fidelity levels in ethnobotanical traditional drug system many allopathic medicine was achieved such as artemisinin, digoxin, aspirin, atropine, morphine, quinine, tubocurarine and reserpine (Gilani and Atta-ur-Rahman, 2005). Further plants chemical compounds like Phenolic compounds, flavonoids, tannins and alkaloids are most major bioactive compounds that have medicinal importance that express specific physiological actions on human body (Edeoga et al., 2005).

Local knowledge and traditional drugs anciently have performed an important role in contagious (Zhang, 1996). For the cure of various diseases, the native people of rural regions rely upon the traditional teachings concerning medicinal plants, (Abbasi et al., 2013). Because the indigenous individuals of the rural zone have awareness about operative uses of medicinal plants and they favor curative plant because of easy convenience of plants and cheap treatment as compared to highly paid medications. The local residents of the rural area have recognized the therapeutic activities of operative plants against specific ailments through their early knowledge (Qureshi, 2004).

In various regions of the world primitive communities have established their own precious knowledge about medicinal plants their uses, natural resource administration and protection (Cotton, 1996). And it has been reported that ancient knowledge regarding curative use of plant have been known universally in every part of the world (Jamila & Mostafa, 2014; Ngarivhume et al., 2015; Bolson et al., 2015), in Pakistan (Qureshi, 2012; Abbasi et al., 2013; Ahmad et al., 2014, and Bibi et al., 2014; Kayani et al., 2015; Rehman et al., 2015). As well as in different regions of Pakistan also many ethnobotanical works have been accomplished (Shinwari, 2010; Shinwari & Khan, 2000; Shinwari & Gilani, 2003; Qureshi & Bhatti, 2008). In Pakistan around 400 plant taxes are therapeutic and around 80% of these are flowering plant species limited to western and northern uplands of Kashmir and Pakistan (Ali, 2008).

As well as the people living in rural regions of Balochistan for their nourishment greatly rely on

biological measures and for them curative plants appeared to be very suitable solution for several health problems (Jamal et al., 2012). Native communities of various regions in Baloch areas have a lifetime old information and folk experience about the utilization herbal drugs and treatment for different ailments. (Bhardwaj & Gakhar, 2005). Awareness about herbal medicine has been carried to descendants via verbally communication and personal participation (Shinwari, 2010). The mountains of northern region in Balochistan are the center for therapeutic medicinal plants in Pakistan (Bibi et al., 2015). Further reported that a sum of 5521 flowering plant taxes belonging to 1572 genera were recognized in Pakistan and from these around 400-600 are therapeutically vital (Bibi et al.,2015). Medicinal plant Texas distributed at Southern Balochistan in Makran division, were documented with their special mode of consumption (Goodman & Ghafoor, 1992; Leporatti & Lattanzi, 1994).

Respiratory disorder was identified in 2019 as an epidemic as a result of novel COVID-19 known as Sever Acute Respiratory Syndrome COVID-19 and was first recognized in Wuhan city in China (Rothana & Byrareddy, 2020; Lu, 2020). The novel corona virus outbreak within the seven weeks of the epidemic in Wahan City of China killed over eighteen hundred and infected more than seventy thousand people. The Chinese Researchers demonstrated and reported that the virus belongs to the beta group of coronavirus and named as Wahan corona virus or 2019 novel coronavirus. The virus was named as SARS-CoV-2 and the ailment was named as the COVID-19 by the International Committee on Taxonomy of Viruses (ICTV) (Cui et al., 2019; Lai et al., 2020; World Health Organization, 2020).

Epidemiological evidence indicated that the transmission of COVID-19 between people is due to personal contact, contaminated objects and via droplets (WHO, 2020). The transmission of respiratory droplets from one person to another is because of infected person's coughs and sneeze. Virus transmit to the nearby person from the inhalation of droplets through mouth and nose and the droplet penetrate the lungs. The virus may also spread by directly contacting with the contaminated things (Rothana & Byrareddy. 2020). The signs of COVID-19 patients include fever with or without chills, pneumonia, and shortness of breath, headache, chest tightness, sweating and dry cough (Rothana & Byrareddy, 2020; Chhikara et al., 2020; Sahin et al., 2020; Zhao et al., 2020). The symptoms of COVID-19 in adults clearly expressed because of already presence of any chronic ailment like diabetes, hypertension, heart diseases or neurodegenerative disorders (Chen et al., 2020).

At the time of this pandemic no particular medicine or vaccine were approved for cure of coronavirus infection. In that epidemic circumstance of severe respiratory ailment caused by Coronavirus it was dire to make or discover antiviral medicine. And it was a challenging work to discover medicine against this pandemic COVID-19 (Zhang et al., 2020). In addition, the ethnobotanical therapeutic plants have powerful activity against viral diseases and have been utilized for the treatment viral diseases (Hudson, 1990). The utilization of herbal medicine is wandering world widely for cure of viral ailments, and these herbal medicine are relatively more easily accessible, inexpensive and carry low chances of toxicity (Barlow et al 2012). It is demonstrated that around 70%-80% of individuals in several under developing countries mostly relay on curative plants for basic health facilities (Hamilton, 2004). It is world widely analyzed that the herbal treatment has effectiveness to combat endemic viral ailment at the of 2003 outbrust because of severe acute respiratory syndrome (SARS) (Zhang et al., 2020). In several pharmacological and phytochemical studies, the beneficial potential of traditional herbal medicines was approved (Adhikari et al., 2021). Many phytochemical compounds with strong activities against virus SARS-CoV-2 and these compound shown a new hope for cure of this ailment (Benarba & Pandiella 2020; Yonesi & Rezazadeh 2020). The secondary metabolites existing in plants generally have useful curative effects. Several secondary metabolites derivatives of medicinal plant species such as lactones,

aliphatics, glycosides, alkaloids, steroids and diterpenoid demonstrated to cause effects against viruses in human beings (Chikezie et al., 2015)

The people of Balochistan mostly relay on therapeutic plants for their basic health care. The local people of different cities use their traditional knowledge about curative plants for the cure of various ailments. At the duration of epidemic COVID-19 there were no proper medicine and vaccine for the cure of this disease in the world as well as in Balochistan. So during this outbreak people of Balochistan in different district were using different medicinal plant for the treatment of symptoms of COVID-19 and symptoms were easily treated by therapeutic plants. During COVID-19 the native people of Pangur used many plants to cure symtoms like cough, fever, flue joint pain, chest problem etc. Some plants like locally known as charmaing, zanjabil, harigosh etc were used. As from the ancient time people of district Panjgoor were using medicinal plant for the cure of several disorders. The knowledge is transferred to the generation from their descendants. Still in this modern era mostly people relay on these medicinal plants for the treatment of various ailments and people mostly concern to aged women of the family and as well as go and concern to health care healers known as “Kawas” in native language Balochi.

The research area has never been ethnobotanically invesigated before so this present study explore the medicinal plant of District Panjgoor. Furthermore, it was needed to find out and document the curative plants that are being used for the symptoms of COVID-19. This study can be counted as the first one which deal ethnobotanical investigation on therapeutic plants in this area. Further this study also sets out to conserve this precious knowledge in documented form as it may disappear in future because in urban areas of district people are being dependent on capital city of province Quetta and Turbat possessing health and other facilities.

## 1. Materials and methods

### 1.1 Geo ethnographical overview

Panjgur is one of the three districts of Division Makran in west Balochistan. On 1st July 1970 when Balochistan became a province of Pakistan and Makran became a district of province Balochistan. 1st July 1977 Makran was divided into three districts named as Panjgur, Gwadar and Turbat (Kech) and Makran was known as a division of Balochistan (Sarfraz, 1997).

Panjgur is situated from from 63°-07′ to 65°-24′ east longitudes and from 26°-14′ to 27°-18′ north latitudes. The total geographical area of Panjgur is 168,91km2. On west the district is by bounded Islamic country Iran, on the east by district Awaran, on the north by district Kharan and on the south by district Kech. Panjgur is a mountainous district and district situated in in the middle of two mountain ranges, the central Makran range that distinct the district from district Kech in the south, and the Siahan range that distinct district from district Kharan in the north. The mountains direction ranges from north-east to south-west. The district is located, 900-1350 meters above the sea level (Sarfraz, 1997).

District is divided into three Tehsil named as Tehsil Panjgur, Tehsil Gowargo and Tehsil Gichk. There are 16 union councils. The headquarters of the district are placed at the central region Chitkan, which is somehow near to other villages. All the people district Panjgur are Baloch and Balochi language the native language which is spoken and understood smoothly by all the people (Sarfraz, 1997).

There are two common descriptions about the word Panjgur given as the name to this district.

Some people explain that the word Panjgur is derived from two Balochi words “Panch” means five and “Gor” means graves. It was said that five aoliyas (Holy persons) were laid to rest in the land of this district. That’s why the area was called as Panchgor later on as time passes it became as Panjgur. The second perspective is on geographical way. Some people say that this area is the land of five stream therefore called as Panjgur. People say the word Panjgur was before Panchkor which is the combination of two words “Panch” means five and “Kor” means stream. With the passage of time the word Panchkor was changed to Panjgur (Sarfraz, 1997).

## 1.2 Geo climate

Panjgoor has a hot desert climate with hot summers and very dry cold winters. Winter is correspondingly longer than summer. Winter begin from October and ends till April while summer starts from May till September. The first month of the year January is coldest month and temperature in winter fall below 10°C while June is the hottest month and the temperature in summer remain below 32°C. Occasionally temperature drops below freezing point because of cold wind locally known by people of district as “Gooreech” (Sarfraz, 1997).

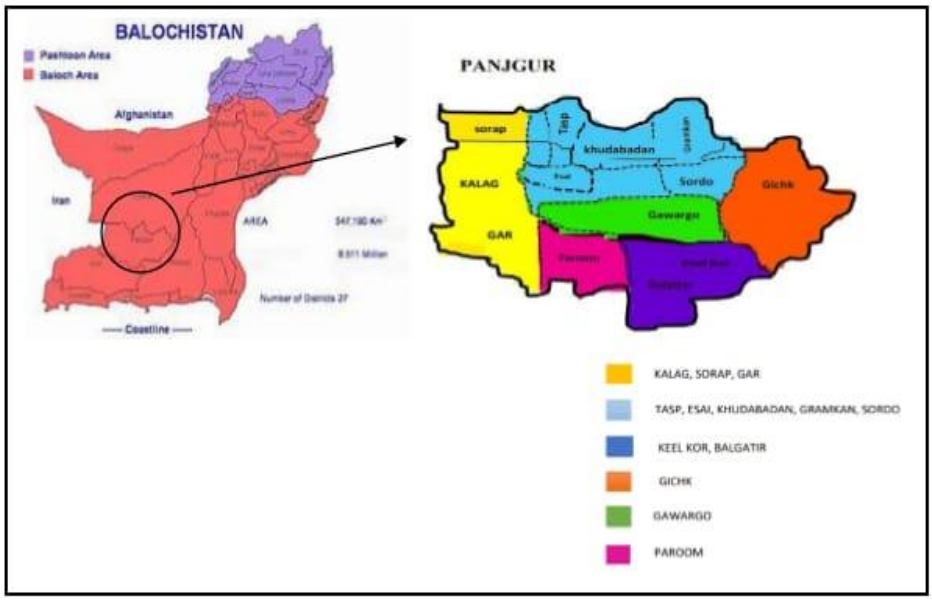


**Figure 1** Map of province Balochistan showing district Panjgoor

## 1.3 Socio economic conditions of the area

District Panjgur is famous and blessed with best quality of date fruits and the Date fruits are the major agricultural produce of district Panjgur which are transported to other districts of the country as well as to other countries too. Vegetables like tomato, onion, lady’s finger, beans, peas and many others are also cultivated and only exported to neighboring districts. Furthermore, many crops like wheat, barley, masoor etc are cultivated. Date fruit selling is one of the major earning source for the people of Panjgur. District is also blessed with wide variety flora and a large number of ethnomedicinal plants like

morpozo, charmaing, gurdir, eshark, kark, shinz kulmurag and many more are found. The people of rural areas of district mostly dependent on these medicinal plants for the treatment of different diseases because of lake of heath care centers. Women have more knowledge about the medicinal plants as compared to male. People also use these medicinal plants as earning source. Bring these medicinal plants from far areas of district and then sell (Sarfraz, 1997).

**1.4 Field interviews**

An ethnobotanical survey was carried out in some regions of Panjgoor. In this study the data on medicinal plants were collected by the help of free listening interviews and open ended questionnaires (Ghobani et al., 2011). The survey was conducted in different towns of district Panjgoor i.e. Tasp, Parome, Kallag, Esai, Khudabadan, Gramkhan, Washbod, Gar, Balgathar, Sordu, Surap, Gowargo (Fig 1). The ethnobotanical information were obtained from native people including man and women of different age groups and as well as Traditional Health Practitioners. Informants were interrogated and data was documented by face to face conversation by going at their homes. The investigation mainly focused on ethnobotanical utilization of medicinal plants for COVID-19 and other diseases by native communities of the district. Interviews were conducted by the use of local language Balochi. The traditional knowledge was collected and incorporated through repeated interrogation for understanding local practices, experiences, interactions with therapeutic plants and ways of preparing herbal drugs. During interview information gathered about local name of plant, used for, plant part used, preparation mode and dosage.

**Collection, Identification and deposition of medicinal plants**

Surveys were conducted in plain and mountainous areas of District Panjgoor for plants collection. Plants were collected during 2021-2022. The collected plant specimens were dried and then preserved after preservation processed for further herbarium techniques suggested by Jain and Roe (1977). Plants were identified. Identification was done for searching the plant name by Flora of Pakistan (Nasir and Ali 1970-1979; Nasir and Ali 1980-1989; Ali and Nasir, 1989–1991; Ali and Qaiser 1993-2007). Voucher specimens were deposited in the herbarium and submitted to the Botany Department of Sardar Bahadur Khan Women University Quetta Balochistan.

**Quantitative Analysis of data**

The data was examined by the use of quantitative value indices such as Use value (UV), Use report (UR), Important consensus factor (ICF), Frequency citation (FC) and relative frequency citation (RFC).

**Informant consensus factor (ICF)**

For testing setting among informants and plant species utilized for each class of diseases the quantitative value informant consensus factor (ICF) was used (Heinrich et al., 1998). For calculating ICF formula used is:

$$ICF = Nur - Nt / (Nur - 1)$$

In this formula “Nur” stands for the number of use report for a specific use category and “Nt” indicate the number of Texas utilized for specific disease category by all informants.

The ICF result ranges from zero to one, if result is near 0 it clarify that there is no exchange of information among people about the use or clarify that informants disagree over which plant to use random selection. If the result is near one then there is a straightforward choosing of Texas utilized to treat specific ailment category information exchange among informants. (Gazzaneo et al., 2005).

**Fidelity level (FL)**

For the determination of FL value used the formula followed by (Friedman et al., 1986). The formula for calculating FL value is:

FL= (Np /N X 100)

Where Np is number of people mentioning the utilization of the Texas for a specific ailment and N the sum of people mentioning the species for any ailment. The FL level indicate the most preferred Texas utilized for the cure of certain ailment.

If FL value is high, then it shows the high frequency of utilization of plant used for cure of specific disease category by the informants.

**Frequency citation (FC) and relative frequency citation (RFC)**

The FC value for plant Texas used was calculated with the help of formula given bellow.

RFC = FC= N/ (< RFC <1)

FC= number of times a specific texa mentioned divided by sum of times that all Texas mentioned multiplied by hundred in this way so the RFC index will be obtained (Tardio and Pardo-de Santayana, 2008).

The relative frequency citation was calculated by dividing number of people mentioning a functional species Frequency citation by the sum of informants in the survey (N). The RFC value vary from zero (when no one cite to a plant as helpful 1), to one (if all the informants mention as helpful).

**Use value (UV) and Use report (UR)**

The formula used for calculating use value for plant recommended by Phillips et al., (1994).

UV = ∑ U/n

Where "U" is the number of use report for each informants and "n" is the sum of informants. The quantitative measure for relative importance of species is obtained from use value. Low use value indicates that there are very few use report for a plant while, high use value shows that there are many use report for a plant, indicating that plant species is important.

## Results and discussion

### Use of plants and demographics

A total of 113 informants were interviewed from twelve towns of District Panjgoor with the help of open ended questionnaire and semi structured interviews. Informants were 81 women and 32 men from these 6 were healers. The informants were of different age between 25-70 years old. Informants were divided into five age groups 25-30, 31-40, 41-50, 51-60 and 61-70 (fig 2.1). Most of the informant were belonging to 61-70 age group. Most of the informants were housewives and formers other were labors, teachers, healers, students. Women were having more traditional knowledge about medicinal plants as compared to men because women look after to their children.

During this study it was observed that new generation have knowledge about herbal medicine it means that this knowledge is being transferred from one generation to another. The plants were collected in different towns of district Panjgur such as Tasp, Kallag, Sordu, Gichk, Gramkhan, Khudabadan, Parom, Balgathar, Gar, Surap, Gowargo and Esai (Table 2.2). A sum of 72 medicinal plant species belonging to 37 families were reported with their local names, part used, Botanical name, family name, utilized for, use values (UV), use report (UR), frequency citation (FC) and relative frequency citation (RFC) are listed in (Table 2.3). These enlisted medicinal plants were reported to be used for the treatment of 62 different diseases. The most dominant used families in term of number of species were Asteraceae and Lamiaceae (with 7 number of species each) followed by Apiaceae (with 6 number of species) and Solanaceae and Fabeaceae (with 4 number of species each) (Table 2.1) and this result shown line with (Aziz et al., 2018; Jan et al., 2017; Bibi et al., 2016) about the family dominance. In the previous studies it was documented that the Asteraceae family is dominant because of its usefulness and essential qualities (Bano et al., 2012, 2014; Blanco et al., 1999).

Leave were the most frequently used part with 36% followed by seed 33% and flower 13% (Fig 2.2). The most common mode of preparation of herbal medicine was decoction with 34%. 100% fidelity level found for five plants i.e. *Calotropis procera* (Aiton) Dryand.,*Citrullus colocynthis* (L.) Schrad., *Plantago ovata*, *Punica granatum L.*, *Plantago lanceolata* L. and *Trichodesma africanum* (L.) Sm. (Table 2.4). Highest use value (UV) was calculated for *Dodonaea viscosa* (L.) Jacq. (0.5). Highest relative frequency citation (RFC) value was recorded for *Trichodesma africanum* (L.) Sm. (0.42). Highest Use Report (UR) was reported for *Rhazya stricta* Decne Seven, followed by *Teucrium stocksianum Boiss.* and *Aerva javanica (Burm.f.) Juss. ex Schult.* Six for each (Table 2.3). Highest Informant consensus factor recoded for urogenital disorders categories with (ICF 0.6) (Table 2.5).

**Table 1 Most used families of the stuy area (Panjgoor)**

| | f Texas |
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**Table 2 Number of species of collected from towns of district Panjgur**

| wns | | cies |
|---|---|---|
| 1 | Tasp | 19 |
| 2 | Kallag | 4 |
| 3 | Esai | 5 |
| 4 | Sordo | 7 |
| 5 | Gowargo | 6 |
| 6 | parome | 4 |
| 7 | Grmkhan | 6 |
| 8 | Khudabadan | 5 |
| 9 | Balgathar | 6 |
| 10 | Gichk | 2 |
| 11 | Gar | 4 |
| 12 | Surap | 4 |

**Table.2** List of ethnobotanical uses of medicinal plants in District Panjgur, Balochistan

| S. NO | Botanical name | Local name | Voucher number | Family | Life form | Part used | Disease treated | Preparation mode | FC | RFC | UR | UV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | *Abelmoschus esculentus* (L.) Moench | Bendi | SBK 21 | Malvaceae | Herb | Fruit | Diabetes | Extract | 9 | 0.07 | 1 | 0.11 |
| 2 | *Achillea abrot anoides* (Vis.) Vis. | Brinjjask | SBK 117 | Asteraceae | Herb | Seed and flower | Fever | Decoction | 11 | 0.09 | 1 | 0.09 |
| 3 | *Achillea mille folium* L. | Bohe madran | SBK120 | Asteraceae | Herb | Flower, leaf | Diarrhea, vomiting and fever | Decoction | 15 | 0.13 | 2 | 0.13 |
| 4 | *Aerva javanica* (Burm.f.) Juss. ex Schult. | Morpzho | SBK 81 | Amaranthaceae | Herb | Flower | Teeth infection, ,eye injury, stomach infection, dysentery, after delivery/ breast cancer | Powder / cooked | 29 | 0.25 | 6 | 0.20 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | *Alhagi maurorum* Medik. | Shinz | SBK 80 | Fabeceae | Shrub | Whole part | Dysentery | Decoction | 13 | 0.11 | 1 | 0.07 |
| 6 | *Allium s ativum* L. | Serk | SBK 16 | Amaryllidaceae | Herb | Tuber | Ear infection | Cooked in sarso oil | 17 | 0.15 | 1 | 0.05 |
| 7 | *Aloe vera* (L.) Burm.f. | Kowaar | SBK 16 | Asphodelaceae | Herb | Jell | Diabetes and joint pain | Jell heated for joint pain, Raw | 8 | 0.07 | 2 | 0.25 |
| 8 | *Anethum graveolens* L. | Gowatag | SBK 64 | Apiaceae | Herb | Seed | Stomach pain and gastric problem | Decoction | 8 | 0.07 | 2 | 0.25 |
| 9 | *Argemone ochroleuca* Sweet | Kalajirree | SBK 213 | Papaveraceae | Herb | Seed | Cough ,chest problem ,stomach pain and ear infection | Decoction, powder | 18 | 0.15 | 3 | 0.16 |
| 10 | *Artemisia persica* Boiss. | Gurdir | SBK 118 | Asteraceae | Herb | Leaf | Foot pain, fever, malaria fever | Decoction | 14 | 0.12 | 3 | 0.21 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11 | *Azadirachta indica* A.Juss. | Shreesh | SBK 41 | meliaceae | Tree | Leaf | Head ach, breast cancer | Powder | 16 | 0.14 | 2 | 0.126 |
| 12 | *Boswellia serrata* Roxb. ex Colebr. | Kondrik | SBK 71 | Bruseraceae | Herb | resin | Joint pain | Powder | 16 | 0.14 | 1 | 0.06 |
| 13 | *Calotropis procera* (Aiton) Dryand. | Kark | SBK 325 | Apocynaceae | Shrub | Stem/ leaves | Skin rash caused by vapors and hot oil, heel pain, tumor, insect bite, prick by a thorn | Powder, milk, | 30 | 0.26 | 5 | 0.16 |
| 14 | *Carica papaya* L. | Papitha | SBK 222 | Cariceae | Tree | Fresh leaf | Dengue fever | Juice | 7 | 0.06 | 1 | 0.14 |
| 15 | *Carthamus tinctorius* L. | Ichk | SBK 121 | Asteraceae | Herb | Flower | Hepatitis A, skin fairness | Paste is mixed with yogurt massage body | 16 | 0.14 | 2 | 0.12 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16 | *Citrullus colocynthis* (L.) Schrad. | Kolkoshtag | SBK 111 | Cucurbitaceae | Herb | Fruit, seed | Feet heat removal, diabetes , gastric problem | Paste of fruit, Infusion | 24 | 0.21 | 3 | 0.12 |
| 17 | *Citrus limon* (L.) Osbeck | Limbo | SBK07 | Rutaceae | Shrub | Fruit | Cholesterol, vomiting | Drops are put in green tea | 17 | 0.15 | 2 | 0.11 |
| 18 | *Citrus medica* L. | Thrunj | SBK06 | Rutaceae | Shrub | Frui, leaf | Hepatitis C and tumor | Juice, Raw leaf | 7 | 0.06 | 2 | 0.28 |
| 19 | *Cocculus pendulus* (J.R. &. G. Forst) Diels | Zamur | SBK 51 | Menispermacea | Shrub | Leaf | Head ach, red and itchy eyes | powder | 11 | 0.09 | 2 | 0.18 |
| 20 | *Cuminum cyminum* L. | Zirrag | SBK 65 | Apiaceae | Herb | Seed | Period pain | Decoction | 5 | 0.04 | 2 | 0.4 |
| 21 | *Datura stramonium* L. | Kontaki | SBK 57 | Solanaceae | Herb | Fruit | For cleaning uterus after miscarriage, heavy period pain | Dried form is cooked and then the resin is eaten | 5 | 0.04 | 2 | 0.4 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 22 | *Daucus carota* L. | Gazark | SBK 66 | Apiaceae | Herb | Seed | Stomach pain | Decoction | 8 | 0.06 | 1 | 0.12 |
| 23 | *Dodonaea viscosa* (L.) Jacq. | Anartrik | SBK 211 | Spaindaceae | Shrub | Leaf , flower, seed | Diarrhea , skin burn , chest infection | Decoction , infusion , past, | 6 | 0.05 | 3 | 0.5 |
| 24 | *Eucalyptus camaldulensis* Dehnh. | Baam | SBK05 | Myrtaceae | Tree | leaf | Cough, cold | Steam | 11 | 0.09 | 2 | 0.18 |
| 25 | *Fagonia arabica* L. | Shurdo | SBK289 | Zygophyllaceae | Herb | Bark | Cough, old fever | Decoction | 32 | 0.28 | 2 | 0.06 |
| 26 | *Ferula oopoda* (Boiss. & Buhse) Boiss. | Hingi patrik | SBK 76 | Apiaceae | Herb | Leaf/resins | Chest infection, cough, stomach worm | Decoction | 21 | 0.18 | 3 | 0.14 |
| 27 | *Ficus carica* L. | Injeer | SBK 96 | Moraceae | Tree | Fruit | Cough | Decoction | 16 | 0.14 | 1 | 0.06 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 28 | *Foeniculum vulgare* Mill. | Raz | SBK 209 | Apiaceae | Herb | Seed | Mouth canker, chest problem, acidity, stomach ach | Powder | 16 | 0.14 | 4 | 0.25 |
| 29 | *Gossypium herbaceum* L. | Kapass | SBK 43 | Malvaceae | Shrub | Seed | Tumor/ chest problem | Powder | 5 | 0.04 | 2 | 0.4 |
| 30 | *Hibiscus sabd ariffa* L. | Karkadaya | SBK42 | Malvaceae | Herb | Leaf, flower | Liver diseases, increase blood | Raw, Decoction | 3 | 0.02 | 1 | 0.33 |
| 31 | *Hordeum vulg are* L. | Jah | SBK 93 | Poaceae | Herb | Seed | Burn bluster | Paste | 19 | 0.16 | 1 | 0.05 |
| 32 | *Iphiona aucheri* (Bois s.) Anderb. | Kulmorag | SBK 312 | Compositae | Shrub | Leaf | Insect bite, injury | Powder | 13 | 0.11 | 2 | 0.15 |
| 33 | *Jaubertia aucheri Guill* | Tusso | SBK 99 | Rubiaceae | Shrub | Flower , leaves | Stomach pain and gastric problem | Powder | 19 | 0.16 | 2 | 0.10 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 34 | *Launaea nudi caulis* (L.) Hook.f. | Shehri Allako | SBK 119 | Asteraceae | Herb | Leaf | Control acidity | Raw | 6 | 0.05 | 1 | 0.16 |
| 35 | *Medicago polymorpha* L. | Shimsh | SBK 76 | Fabaceae | Herb | Whole parts | Control high blood pressure | Raw | 7 | 0.06 | 1 | 0.14 |
| 36 | *Medicago sativa* L. | Sposth | SBK 79 | Fabaceae | Herb | Leaf | Ear infections | Extract | 8 | 0.07 | 1 | 0.12 |
| 37 | *Mentha arvensis* L. | Podina | SBK 22 | Lamiaceae | Herb | Leaf | Stomach problem | Juice | 18 | 0.15 | 1 | 0.05 |
| 38 | *Menthe longifolia* (L.) | Purchink | SBK 24 | Lamiaceae | Herb | Leaf | Gastric problem | Raw | 12 | 0.10 | 1 | 0.08 |
| 39 | *Nannorrhops ritchieana (Griff.) Aitch* | Baddul | SBK 83 | Arecaceae | Shrub | Root, leaves | Stomach pain/ dysentery | Raw , decoction | 11 | 0.09 | 2 | 0.18 |
| 40 | *Nepeta praetervisa* Rech. f. | Simsok | SBK04 | Lamiaceae | Herb | Flower Leaf,stem, | Old fever, cough, stomach pain | Paste, decoction | 20 | 0.17 | 3 | 0.15 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 41 | *Nerium oleander* L. | Jhor | SBK 324 | Apocynaceae | Tree | Leaf | Tumor, pimple | Raw | 9 | 0.07 | 2 | 0.22 |
| 42 | *Ocimum basilicum* L. | Nazbo | SBK 08 | Lamiaceae | Herb | Flower and leaf | Stomach problem | Juice | 11 | 0.09 | 1 | 0.09 |
| 43 | *Ocimum tenuiflorum* L. | Gowadro P | SBK 25 | Lamiaceae | Herb | Seed + leaf | Dysentery, pimple in eye | Powder / seed | 14 | 0.12 | 2 | 0.14 |
| 44 | *Peganum harmala* L. | Ispondan | SBK 202 | Nitrariaceae | Herb | Seed | Cough, tumor,Stomach problems, eye injury | Decoction (Boiled for cough and stomach) / powder for tumor | 37 | 0.32 | 4 | 0.108 |
| 45 | *Pennisetum glaucum* (L.) R.Br. | Zorath | SBK 91 | Poaceae | Herb | Seed | Skin rashes caused by Dengue, | Powder | 3 | 0.02 | 1 | 0.33 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 46 | *Phoenix dactylifera* L. | Karaba hurmag | SBK 84 | Arecaceae | Tree | Fruit | Dilute clotted blood of head caused by any accident and for broken bone | Paste is cooked | 26 | 0.23 | 2 | 0.07 |
| 47 | *Plantago ovata* | Danichk | SBK 182 | Plantaginaceae | Herb | Seed | Stomach pain, dysentery, skin rash in hairs | Seed, paste | 21 | 0.18 | 3 | 0.14 |
| 48 | *Plantago lanceolata* L. | Areegosh | SBK 180 | Plantaginaceae | Herb | Seed/ leaves | COVID-19 Cough, chest pain, fever | Decoction, Raw | 38 | 0.33 | 3 | 0.07 |
| 49 | *Plantgo major* L. | Areegosh | SBK 181 | Plantaginaceae | Herb | Seed, leaves | COVID-19 Cough, chest pain, fever | Decoction, Raw | 18 | 0.15 | 3 | 0.16 |
| 50 | *Portulaca oleracea* L. | Chipli | SBK 93 | Portulacaceae | Herb | Leaves | Stomach problem | Raw | 3 | 0.02 | 1 | 0.33 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 51 | *Psammogeton biternatum* Edgew. | Izbothk | SBK 77 | Apiaceae | Herb | Seed | Body pain, head ach, paralysis, breast cancer | Decoction , cooked | 29 | 0.25 | 4 | 0.13 |
| 52 | *Pulicaria undulata* (L.) C.A.Mey. | Bodakuh | SBK122 | Asteraceae | Herb | Leaf | Diarrhea | Decoction | 4 | 0.03 | 1 | 0.25 |
| 53 | *Punica granatum* L. | Anar danag | SBK 202 | Lythraceae | Tree | Seed, peel of fruit | Vomiting and nausea | Infusion | 20 | 0.17 | 2 | 0.1 |
| 54 | *Raphanus sativus* L. | Moli | SBK 101 | Brassicaceae | Herb | Root | Ear infection | Extract | 9 | 0.07 | 1 | 0.11 |
| 55 | *Rhazya stricta* Decne. | Aeshark | SBK 323 | apocynaceae | Shrub | Fresh leaves/ root powder | Body heat removal, increase hair growth, Fever, teeth infection, stomach warm, mouth canker, piles, | Paste /powder for canker and piles used, | 39 | 0.34 | 7 | 0.17 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 56 | *Ricinus communis* L. | Morpad | SBK 178 | Euphorbiaceae | Tree | Seed | Tumor | Powder | 6 | 0.05 | 1 | 0.16 |
| 57 | *Rosa damascena* L. | Gulsor | SBK 133 | Rosaceae | Shrub | Leaf | Fever | Powder | 19 | 0.16 | 1 | 0.05 |
| 58 | *Salvia aegyptiaca* L. | Mour | SBK05 | Lamiaceae | Herb | | Stomach pain | decoction | 11 | 0.09 | 1 | 0.09 |
| 59 | *Solanum nigrum* L. | Tholangoor | SBK 55 | Solanaceae | Herb | Fruit, leaf | Teeth warms, cough | Raw / decoction | 21 | 0.18 | 2 | 0.09 |
| 60 | *Tamarix dioica* Roxb. ex Roth | Gazz | SBK 219 | Tamaricaceae | Tree | Seed | Teeth infection | Powder | 17 | 0.15 | 1 | 0.05 |
| 61 | *Teucrium stocksianum* Boiss. | Kalporag | SBK 21 | Lamiaceae | Herb | Seed,flower and stem | Diarrhea, stomach pain, gastric problem, vomiting, insect bite, injury | Decoction, powder | 27 | 0.23 | 6 | 0.22 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 62 | *Tribulus terrestris* L. | Sading | SBK 287 | Zygophyllaceae | Herb | Whole plant | Kidney pain and stone | Decoction | 21 | 0.18 | 2 | 0.09 |
| 63 | *Trichodesma africanum* (L.) Sm. | Charmahing | SBK 31 | Boraginaceae | Herb | All parts | COVID-19 Cough, chest problem | Decoction | 48 | 0.42 | 2 | 0.04 |
| 64 | *Trigonella foe numgraecum* L. | Humbag | SBK 61 | Fabaceae | Herb | Seed | Body pain | Decoction | 3 | 0.02 | 1 | 0.33 |
| 65 | *Vitex agnus-castus* L. | Gowanik | SBK 83 | Verbenaceae | Shrub | Seed | Stomach pain, kidney stone | Decoction | 22 | 0.19 | 2 | 0.09 |
| 66 | *Withania coagulans* (Stocks) Dunal | Paner bad | SBK 132 | Solanaceae | Herb | Seed | Diarrhea, tumor in uterus, skin rashes | Decoction, infusion | 31 | 0.27 | 3 | 0.09 |
| 67 | *Withania. somnifera* (L.) Dunal. | Kakenk | SBK 56 | Solanceae | Shrub | Root | Pimple/purify blood | Decoction | 6 | 0.05 | 2 | 0.33 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 68 | *Zataria multiflora* Boiss. | Izgind | SBK 9 | Asteraceae | Herb | Leaf and seed | COVID-19 Cough, flue, chest problem, old fever, Measles | Decoction, smoke | 31 | 0.27 | 5 | 0.16 |
| 69 | *Zea mays* L. | Makai | SBK 92 | Poaceae | Herb | Style of female flower | Kidney disorders, kidney stone, kidney pain, | Powder | 19 | 0.16 | 3 | 0.15 |
| 70 | *Zingiber officinale* Roscoe | Zanjabeel | SBK 11 | Zingiberaceae | Herb | Root | COVID-19 Cough and flue | Decoction | 28 | 0.24 | 2 | 0.07 |
| 71 | *Ziziphus mauritiana* Lam. | Konar | SBK1 | Rhamnaceae | Tree | Seed and fruit, leaf | Stomach pain and pimple | Raw grinded is direct eaten/ Raw leaf grinded paste applied on circle of pimple | 7 | 0.06 | 2 | 0.28 |
| 72 | *Zygophyllum sp* | Kerech | SBK288 | Zygophyllaceae | Shrub | Flower | Stomach pain | Decoction, infusion, | 18 | 0.15 | 1 | 0.05 |

**Two plants species with single local name and single use**

*Plantago lanceolata* L. and *Plantgo major L.* are two different plant species belonging to the same genus *Plantgo,* locally both are known as Harigosh and used for the treatment of cough and fever. Just because they have some identical morphological character's local people give them the same name and use for same purpose (Palate 1).


**Plate1.** (a) Plantgo major L. (b) Plantago lanceolata L**.**

**Use parts for medicinal purpose**

The interview results for this study reported that different parts of plant species being used as herbal medicine such as leaves, stems, seed, tubers, flowers (Fig.2.2). Leaves were reported to be the most dominantly used part with 36% followed by seeds 33%. (Malik et al., 2018) in their work shown the same result that leaves are the most dominant part utilized. It is reported that leaves are more easily achievable in nature and comparatively to other parts of the plants leaves are more important (Bonet et al., 1999; Neves et al., 2009). The other parts were flower with 13%, fruit 11%, root 7%, stem, whole parts and resins 6% for each and the least used parts were tuber jell, peel of fruit and bark with 1%. Among different region of Pakistan in elsewhere studies shown that leaves are considered to have extractable phytochemicals that show valuable concerning treatments (Ahmad et al., 2014, Bano et al., 2014). (Srithi et al., 2009) reported in their study that leaves are commonly used pattern just because leaves have more abundant bioactive complexes. Additionally, (Odonne et al., 2013) reported that leaves are the

sustainable resource found in all types of plants in herb, shrub and trees. The usage of other plant part such as flower and root can affect the plant life cycle but the utilization of leaves does not and leaves are the most available part for several months (Kala, 2005; Bhat et al., 2013). This study also shows line result with (Ghimire et al., 2008; Giday et al., 2003) who reported leaves are the dominantly utilized part also reported that cut of whole plant or sever utilization of seed, fruits or roots as drugs can destroy plant population and may give on to high reduction to ethnomedicinal plant population in world. The local people of District Panjgoor prefer leave part of herbal medicine preparation because they think leaves are more effective for the treatment of ailments and are easily accessible.

**Herbal drug preparation method and administration route**

In the study area the most common mode of preparation of herbal medicine was decoction with 34% followed by powder with 20% (Fig .2.3). The result of this study is line with other studies that most commonly method of preparation of herbal medicine are decoction and grinding for extracting the bioactive compound (Deeba., 2009). The other mode of preparation included in this study were raw with (14%) followed by paste (9%), cooked (6%), infusion (5%), juice and extract (4% for each), milk and sap (2%), smoke and steam (1% for each). Mostly herbal remedies are formed with mixture of two more medicinal plant and also herbal plant are mixed with other ingredients such as milk, yogurt, dasi gea, honey, brown sugar etc. There were five medicinal plants used during COVID-19 for the sever cough (Table 2.3) are boiled and decoction is taken. Most of people recommended honey and turmeric for mixing in remedy for the cure of cough. Because people think that honey and turmeric have high healing power that can cure infections present in respiratory tracks.

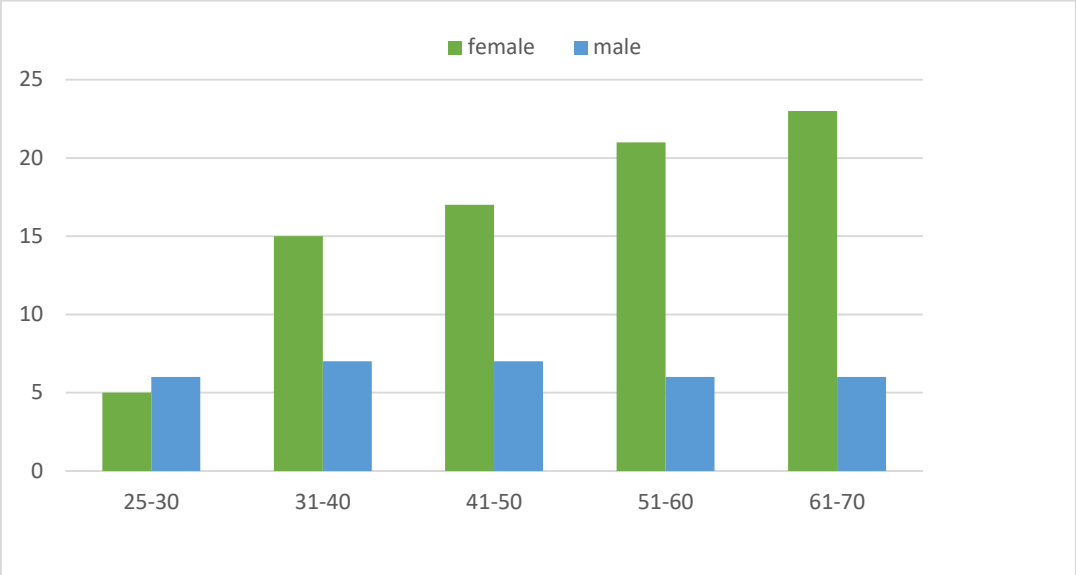


**Figure 2** Distribution of gender, age and number of informants interviewed

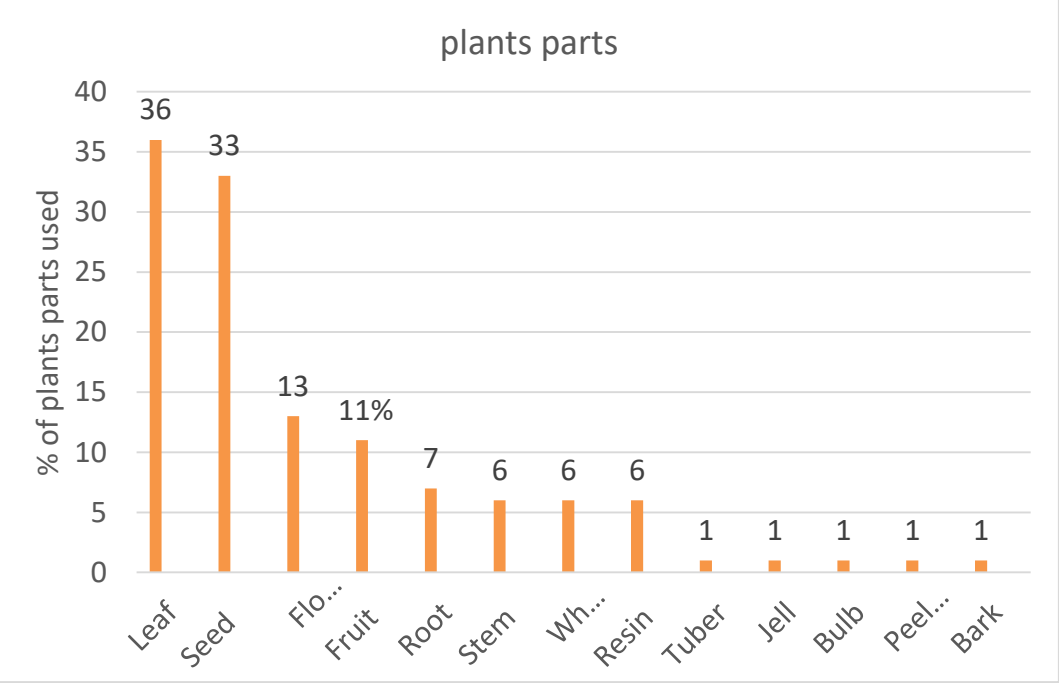


**Figure 3** Percentage of plant parts in district Panjgoor

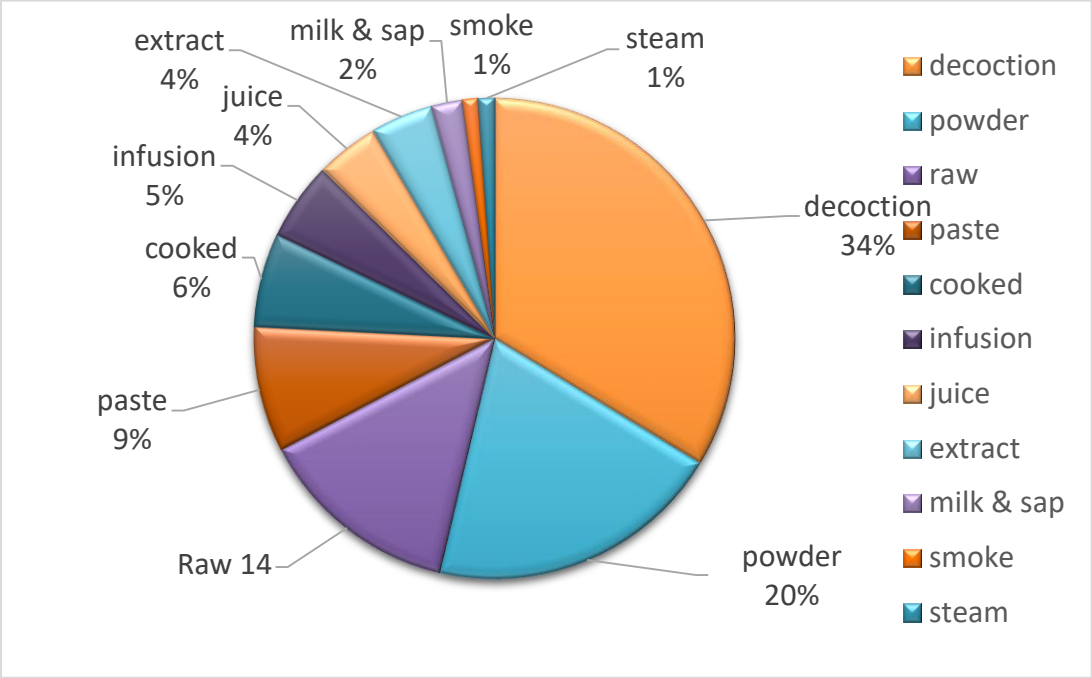


**Figure 4** Percentage of herbal drug preparation mode in district Panjgoor

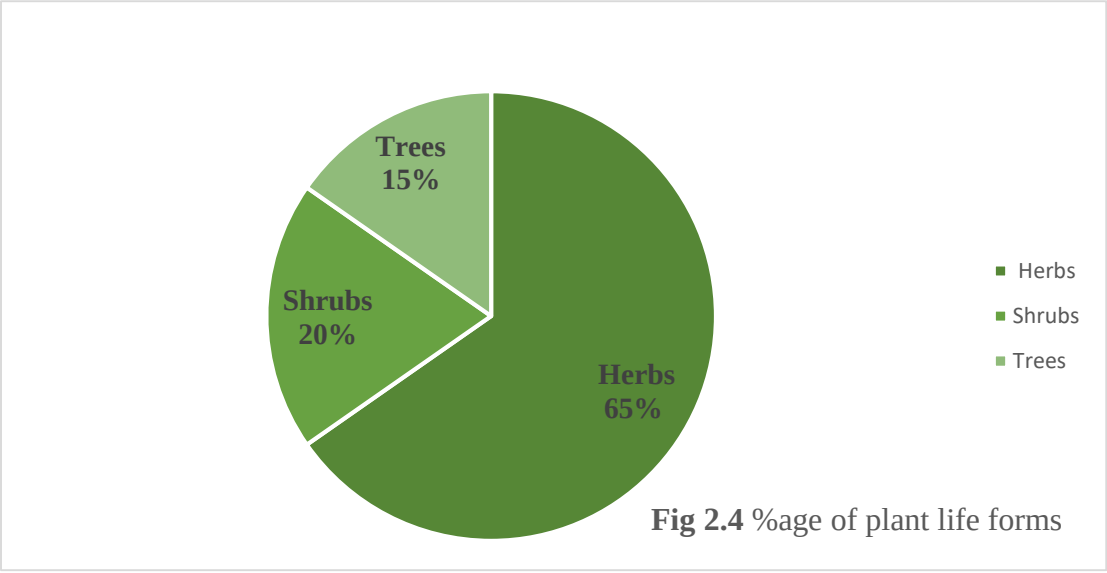


**Figure 5** percentage of plant life forms in district Panjgoor

**Dosage of medicinal plants**

According to the informants herbal drugs were prescribed to the patients according to their ages. They also prescribed that herbal medicine has no side effects are save for use. Smaller quantity of dosage was prescribed for children and infants as

compared to adults. For dosage quantity calculation glass, cup, spoon and handful were used. Treatment time were according to the diseases category. Such as for breast cancer two to three months' dosage is applied. For minor symptoms of any disease treatment time ranges from one to three or one to seven days mostly.

**Plants life forms**

Most abundantly used medicinal plants life form from the study were herbs with 65% followed by shrubs 20% and trees 15% (Fig 2.4). (Ahmed et al., 2014) in his study in the Chail velley of Pakistan and (Qurashi, 2012) in his work in Hingol National Park Balochistan documented the same result about the dominance of herbaceous life form. It is reported that the highly utilization of herbaceous life form may indicate their importance and it could also be a reason that they are more easily achievable or available and as compared to other life form herbs have more healing capacity for diseases (Sing et al., 2012). This study shows same result about the familiar utilization of herbaceous plants for treatment purposes from different parts of the world (Tabuti and Dhillion 2003; Uniyal et al., 2006). This was also reported by the researchers that herbaceous life form is ecologically widely distributed all over the world (Ibrar et al., 2007; Jan et al., 2011).

**Quantitative Analysis**

**Use value (UV), Use report (UR)**

Highest Use Report was calculated for *Rhazya stricta* Decne (UR7) followed by *Aerva javanica* (Burm.f.) Juss. ex Schult. And *Teucrium stocksianum* Boiss. (UR6) for each *Calotropis procera* (Aiton) Dryand. (UR5) for each and least use report (UR) recorded for 26 plant species (UR1) (Table 2.3).Use value (UV) used for the calculation of relative importance of plants among the people and for well understanding the established knowledge about medicinal plants within a community demonstrated by (Tard´ıo and Pardo-de-Santayana, 2008) (Nasab and Khosravi, 2014). The highest Use Value reported in this study was (0.5) and the lowest use report was (0.04). The highest use value was calculated for *Dodonaea viscosa* (L.) Jacq with (UV 0.5) followed by *Datura stramonium* L., *Cuminum cyminum* L.and *Gossypium herbaceum* L. with (UV 0.4) for each, *Trigonella foenum-graecum* L., *Pennisetum glaucum* (L.) R.Br. *Withania. somnifera* (L.) Dunal, *Portulaca oleracea* L. *Hibiscus sabdariffa* L. with (UV 0.33) for each and least use value recoded for *Trichodesma africanum* (L.) Sm with (UV 0.04) (Table 2.3). It was reported by (Ayyanar & Ignacimuthu, 2011) that high use value of specific therapeutic plant species makes certain flexible uses of these plant Texas in the study area.

**Relative Frequency Citation (RFC)**

In ethnobotanical indices relative frequency citation (RFC) was used for finding out the most known medicinal plant with in the study area between the population. Highest relative frequency citation (RFC) value was recorded for *Trichodesma africanum* (L.) Sm. (0.42) and then the second highest RFC value recorded for *Rhazya stricta* Decne

(0.34). The least RFC value calculated for three medicinal plants *Pennisetum glaucum* (L.) R.Br., *Portulaca oleracea* L. and *Hibiscus sabdariffa* L. (0.02) for each (Table 2.3). The popularity of these two plant *Trichodesma africanum* (L.) Sm. and *Rhazya stricta* Decne among the people of district Panjgoor indicates that these two plants have high curative power and easily accessible. *Trichodesma africanum* (L.) Sm is easily accessed during the months of March, April and May in plane and mountainous areas of Tasp village and local people also purchase this plant. *Rhazya stricta* Decne is considered in highly dominant plants species of the district found everywhere and found in most of months in year. The plants with least RFC value *Pennisetum glaucum* (L.) R.Br., *Portulaca oleracea* L. and *Hibiscus sabdariffa* L. also easily available local people may use alternate for the treatment of disorders and less people know about these plants. (Mukherjee et al., 2012) reported that medicinal plants with greater relative frequency citation must be put through studies to examine their phytochemical and pharmacological authenticity.

**Fidelity Level (FL)**

The Fidelity level of plant species for the treatment of specific ailments category in the work area differ between 60% and 100%. Fidelity level of 25 medicinal plant species were calculated. 100% fidelity level were reported for 6 plants species *Calotropis procera* (Aiton) Dryand. (Skin rash caused by vapors and hot oil, heel pain, tumor, insect bite, prick by a thorn) *Citrullus colocynthis* (L.) Schrad, (Temperature, diabetes, gastric problem) *Plantago ovata* (Stomach pain, dysentery, skin rash in hairs) *Punica granatum* L. (Vomiting and nausea), *Trichodesma africanum* (L.) Sm. (COVID-19 Cough, chest problem) *Plantago lanceolata* L. (COVID-19 Cough, chest pain, fever) (Table 2.4). This result about the plant *Citrullus colocynthis* (L.) Schrad, FL value is line with (Bibi et al., 2014). This calculation about the plant fidelity level (FL) value indicates that local people of Panjgoor district still relay on these medicinal plants for their basic health care and the values of these therapeutic plant between the local people have not lost yet. However, it has been demonstrated that medicinal plants with less fidelity level must not be rejected as reducing to declare them to the upcoming generation that it could expand the threat of moderate vanishing of the knowledge (Chaudhary et al., 2006).

**Tabl e3 Medicinal plants fidelity level (FL) for study area Panjgur**

| S no | Plant name | No of informants reported the taxa | No of ailments treated | No of most frequently determined by informants | FL |
|---|---|---|---|---|---|
| 1 | *Aerva javanica* (Burm.f.) Juss. ex Schult. | 29 | 6 | 27 | 93.10 |
| 2 | *Calotropis procera* (Aiton) Dryand. | 30 | 5 | 30 | 100 |

| | | | | | |
|---|---|---|---|---|---|
| 3 | *Citrullus colocynthis* (L.) Schrad. | 24 | 1 | 24 | 100 |
| 4 | *Fagonia arabica* L. | 32 | 2 | 30 | 93.32 |
| 5 | *Ferula oopoda* (Boiss.&Buhse)Boiss. | 21 | 3 | 15 | 71.42 |
| 6 | *Hordeum vulgare* L. | 19 | 1 | 14 | 73.68 |
| 7 | *Jaubertia aucheri* Guill | 19 | 2 | 16 | 84.21 |
| 8 | *NepetapraetervisaRech.* f. | 20 | 3 | 17 | 85 |
| 9 | *Plantago ovata* | 21 | 3 | 21 | 100 |
| 10 | *Phoenix dactylifera* L. | 26 | 2 | 25 | 96.15 |
| 11 | *Plantago lanceolata* L. | 38 | 3 | 38 | 100 |
| 12 | *Psammogeton biternatum* Edgew. | 29 | 4 | 23 | 79.31 |
| 13 | *Peganum harmala* L. | 37 | 4 | 29 | 78.37 |
| 14 | *Punica granatum* L. | 20 | 2 | 20 | 100 |
| 15 | *Rhazya stricta Decne.* | 39 | 6 | 35 | 89.74 |
| 16 | *Rosa indica* L. | 19 | 1 | 16 | 84.21 |
| 17 | *Solanum nigram* L. | 21 | 2 | 20 | 95.23 |
| 18 | *Tribulus terrestris* L. | 21 | 2 | 16 | 76.19 |
| 19 | *Trichodesma africanum* (L.) Sm. | 48 | 2 | 48 | 100 |
| 20 | *Teucrium stocksianum* Boiss. | 27 | 6 | 22 | 81.48 |
| 21 | *Vitex agnus-castus* L. | 22 | 2 | 16 | 72.72 |
| 22 | *Withania coagulans* (Stocks)Dunal | 31 | 3 | 25 | 80.64 |
| 23 | *Zataria multiflora* Boiss. | 31 | 5 | 29 | 93.54 |
| 24 | *Zea mays* L. | 19 | 3 | 13 | 68.42 |
| 25 | *Zingiber officinale* Roscoe | 28 | 2 | 24 | 85.71 |

**Use categories and Informants Consensus Factor (ICF)**

In this study 72 medicinal plants were reported used for 63 different diseases. First these 62 ailments were put in to 14 broad disease categories (Table 2.5). Highest number of species in this study area were utilized for cure of gastrointestinal problems (30 medicinal plants) and the second highest number of species for respiratory disorders with (15 number of species). This study result shown consistent with recording of other ethnobotanical study in district Mastung (Bibi et al., 2014) as well as shown a

likeness in result about most used Texas greatly cited for gastrointestinal and then respiratory diseases (Kiyani, 2015). The other authors also recoded that mostly the therapeutic plant species were used for the cure of gastrointestinal disorders in their studies (Ullah et al., 2014; Ullah et al., 2013). It was demonstrated that in Balochistan the most predominant ailments are respiratory and gastrointestinal problems (Sadeghi et al., 2014). In few region of the globe many ethnopharmecological research demonstrated that among the use categories gastrointestinal disorder is the first one (Heinrich et al., 1998; Miraldi et al., 2001; Ghorbani, 2005; Ghorbani et al., 2011). All over the world different indigenous groups in various communities utilize a considerable number of medicinal plants for the treatment of various gastrointestinal problems (Ankli et al., 1999; Bennett and Prance, 2000).

In this study the informants' consensus factor (ICF) for therapeutic plants rages from (0-0.6). Highest Informant consensus factor recoded for urogenital disorders categories with (ICF 0.6) and lowest calculated for seven diseases categories with (0 ICF) (Table 2.5). It has been reported that the greater value of informant consensus factor showed sensible solidity of knowledge about the utilization therapeutic herbs (Lin et al., 2002).

**Table 4** Percentage of species and citation in each medicinal catagory**.**

| S. no. | Disease category | No. of use reports | %age of use reports | No. of species | %age of taxa used | Informants consensus factor (ICF) |
|---|---|---|---|---|---|---|
| **1** | Respiratory diseases ( cough, COVID-19, cold, flue, chest problem) | 24 | 15.6 | 15 | 12.2 | 0.39 |
| **2** | Gastrointestinal problem ( stomachache, gastric, vomiting, constipation, diarrhea, dysentery, piles, acidity | 41 | 26.7 | 30 | 24.5 | 0.275 |
| **3** | Gynecological problems ( delivery, miscarriage, menstrual | 5 | 3.2 | 4 | 3.2 | 0.24 |
| **4** | Antinode ( insect bite, snake bite) | 3 | 1.9 | 3 | 2.4 | 0 |
| **5** | Glandular diseases ( diabetes, hepatitis A & C, liver disorders, breast cancer ) | 9 | 5.8 | 9 | 7.3 | 0 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **6** | Urogenital problems ( kidney pain , kidney stone) | 6 | 3.9 | 3 | 2.4 | 0.6 |
| **7** | Infectious diseases ( measles, malarial fever, dengue fever, fever ) | 14 | 9.1 | 12 | 9.8 | 0.15 |
| **8** | Dermatological disorders( burn, pimples, wound, skin rashes, tumor) | 17 | 11.1 | 13 | 10.6 | 0.25 |
| **9** | Ear infection mouth cankers | 6 | 3.9 | 6 | 4.9 | 0 |
| **10** | Feet heat removal, head heat removal | 2 | 1.3 | 2 | 1.6 | 0 |
| **11** | Circulatory disorders ( blood diluting , blood pressure, blood purifier, cholesterol) | 6 | 3.9 | 6 | 4.9 | 0 |
| **12** | Eye diseases | 4 | 2.6 | 4 | 3.2 | 0 |
| **13** | Musculoskeletal problems( bone fractures, joint pain, feet pain, toothache, headache) | 14 | 9.1 | 13 | 10.6 | 0.07 |
| **14** | beauty care, hair tonic | 2 | 1.3 | 2 | 1.6 | 0 |

**Active phytochemicals of some medicinal plants for COVID-19 and other viral diseases.**

Secondary metabolites are as well as known as phytochemicals perform a vital role in plants (Pott et al., 2019). Secondary metabolites or phytochemicals are organic compounds which aren't only directly associated in survival of plant, anyhow they also yield small range of substances which promote natural growth and development in plants (Pott et al., 2019). Phytochemical or secondary metabolites are products which are yielded by biosynthetic processes from the primary metabolites (Mendoza & Silva 2018).The secondary metabolites of several medicinal plants have been reported to exhibit preventive properties against various ailments and these are glycosides terpenoids, steroids, flavonoids, alkaloids, tannins and saponins etc. In this era, about 80% of population world widely relay on traditional therapeutic plant as an important source of their basic health care (Batiha et al., 2020; Dorman et al., 2000). Although these phytochemicals perform a vital role in inhibititory properties such as antiparasitic, antiaging, anti-inflammatory, anticancer, antioxidant, antidepressant and wound healing

(Bahramsoltani et al., 2014). This study reported some medicinal plant with their active phytochemicals in (Table 2.6).

In this study it has been reported that *Zingiber officinale* Roscoe is used to treat cough and flue further it was widely used during COVID-19. However, it has been demonstrated in other studies that rhizome of *Zingiber officinale* Roscoe exhibit aromatic vanillyl ketones which consists of [6]-gingerol and [6]-paradol phytochemicals which exhibit curative health accounts such as antiviral and anticancer activities (Abd El Wahab et al., 2009). More over other researcher reported that phytochemical of this plant such as 8-Gingerol and 10-Gingerol showed effectiveness against COVID-19 diseases (Rajagopal et al., 2020). It was examined that the important constituents of essential oil of plant *Zingiber officinale* Roscoe such as hyssop oil contain mostly monoterpenes (e.g., 1-pinocamphone, isopinocamphone, pinocarvone, and -pinene), sesquiterpenes (zingiberene, bisabolene, sesquiphellandrene, and curcumen), sandalwood oil exhibits sesquiterpene alcohols (e.g., santalol, bergamotol, and santalene) and Thymus vulgaris oil (thymol and carvacrol) that showed response against virus and destroyed the envelope of virus before entering the host cell (Schnitzler et al., 2007).

*Trichodesma africanum* (L.) Sm. species which is locally knowns as "charmahing" by Baloch people and it has been reported to be used for cure of cough and chest problem in this study and this result is harmony with (El Ghazali et al., 2010) who also reported that whole plant part indigenously utilized to cure cough. In accordance to the pharmacological statements this plant exhibits antioxidant, anti-inflammatry and antibacterial activities. Some of the pharmacologically active phytochemicals examined in this medicinal plant are triterpenes, anthraquinones, alkaloids, flavonoids, tannins and sterols. furthermore the compound contained in the essential oil of this plant were reported which are α-muurolene, elemol, Caryophyllene oxide, carvone and γ-eiudesmol, (El Moaty, 2009; Abdullah Emad & Gamal, 2013; Jaradat et al., 2016).

*Zataria multiflora* Boiss.in current study reported to be used cough, flue, chest problem, old fever and Measles likewise other researcher also documented that this plant is broadly utilized to cure respiratory ailments as it contains strong anti- oxidative and anti-inflammatory effect. Furthermore, it has been reported that medication with *Zataria multiflora* Boiss. Within two months cure the respiratory signs in victim suffering from asthma, successfully lowered the inflammatory cells and this was analyzed by improved pulmonary action tests (Alavinezhad et al., 2022).

In this study *Argemone ochroleuca* plant was reported for treatment of Cough, chest problem, stomach pain and ear infection. In many countries such as North Africa, Mexico and India *Argemone ochroleuca* is demonstrated to be used for the treatment cough, skin diseases, glaucoma, tachycardia and eye disorders (Ruio-Piña & Vazquez-Flota, 2013; Brahmachari et al., 2013).

*Plantago* species in this study reported by the informants to be utilized for common cough and during COVID-19 used to treat cough too and it may contain antiviral properties. As it has been reported that the phenolic metabolites of *Plantago major* L. showed action against virus (Ben Sassi et al., 2008).

*Rhazya sricta* Decne.in this study reported to have the highest use report. The phytochemical compound of *Rhazya stricta* Decne. The crude ethanolic residues contain

some measurable antibacterial properties against several types of gram negative and gram positive bacteria and the extract from this plant showed high effectivness as compared to antibiotic Co-trimoxazole to few bacteria (Ahmed & Fatima, 2004). It has been documented that *Rhyaza stricta* Decne. Plant is enriched with many secondary metabolites such as tannins, flavonoids, phenols, steroids, alkaloids and saponins (Reddy et al., 2016). As it was reported plant which contain different phenolic constituents like tannans and flavonoids which are containing rich amount of hydroxyle group in central part of these compounds are regarded to have anti- inflammatory and anti- oxidant activities (Poojary et al., 2015).

*Azadirachta indica* A.Juss which is an evergreen plant reported to have medicinal activities (Islas et al., 2020). It has been reported to be used for the treatment of headache. The leaves part of the plant in powdered form indigenously mixed with honey to cure respiratory disorders such as cough and many other (Alqethami et al., 2020). Several phytochemicals are found and have properties against several diseases such as Limonoids, tannins, alkaloids, terpenoids, flavonoids and catechins. Flavonoids contain anti-inflammatory activities, nimbin which is a triterpene chemical constituents accountable for large number of plant's pharmacological properties (Islas et al., 2020, Braga et al., 2021).

*Peganum harmala* L. which is locally known as “Spandan” and reported to be used for the cure of cough and stomach problem. It has been reported that from the seed of *Peganum harmala* L. aqueous distillate extracted exhibit antihistaminic, antiadrenergic and antispasmodic activities (Aqel and Hadidi, 1991). It has been reported alkaloids of *Peganum harmala* L. such as pure vasicine or vasicinone work as bronchodilator (Mahmoudian *et al.,* 2002). However, many other studies have reported that Beta-carboline a constituent of alkaloid from plant *Peganum harmala* L. that exhibit immune-modulatory properties (Wang et al., 1996).

*Ficus carica* L. which was reported to be utilized for the cure of cough in this present study. However, in other paper it has been reported that plant is strong against many infectious microbe strains and various cancer cell lines (Badgujar et al., 2014). The ethanolic distillate of *Ficus carica* L. plant demonstrated to have anti- inflammatory activities (Patil & Patil, 2011). Further it has been reported that the ethanolic distillate of *Ficus carica* L. in a dose dependent way exhibit strong antipyretic activity (body temperature reduction) (Badgujar et al., 2014).

*Foeniculum vulgare* Mill which was reported to be used as a traditional medicine for the treatment of mouth canker, chest problem, acidity and stomachache in this study area. Moreover, in other studies it has been documented the leaves and shoots were utilized for bronchitis and constant cough. Because of high level of ascorbic acid and phenolic compound presence in shoots of the plant, it contains anti- oxidant characteristics (Barros et al., 2009).

*Dodonaea viscosa* Jacq is traditionally utilized as a drug to cure several diseases such as fever, wound sore throat, piles, sinusitis flu, arthritis, cold malaria (Tadese, 1994; Lemordant, 1971), and in current study it was reported to be used against diarrhea, skin burn, and chest infection. It has been documented that methanol the leaf distillate of *Dodonaea viscosa* Jacq contain antiviral properties in case of Influenza A virus and

Coxsackie virus and as well as contain antibacterial properties against Corynebacterium diphtheria, Staphylococcus aureus and Streptococcus pyogenes (Getie et al., 2003).

*Citrus medica* L. in this study reported from the respondents to be used for the cure of HCV by the local people and other authors in addition reported that the phytochemicals such as polysaccharides and polyphenole present in *Citrus* species boost up immune system in our body (Shen et al., 2017). *Citrus medica* L. reported to be broadly utilized as a traditional drug as it exhibits antivirus, antibacterial, antioxidant and anticancer properties (Pieroni et al., 2004; Sahoo et al., 2021). Further this species is recommended that it could reduce viral load of SARS-CoV-2 in nasal passage by making a mixed remedy with *Zingiber officinalis* Roscoe (Haridas et al., 2021). From various part of plant *Citrus medica* L. flavonoids and phenols constituents were reported to have antioxidant properties (Chan et al., 2010; Chen et al., 2012; Ebrahimi et al., 2019). Other study has documented the flavonoid constituents of *Citrus. medica* L. including apigenin, hesperidin and naringin that exhibit powerful anti-inflammatory properties (Xiao et al., 2018).

*Carica papayas* documented for cure of dengue virus and as well as it has been reported in other studies to be used for treatment of other viral diseases. It has been documented that *Carica papayas* species contain attributes that could boost immune system in divers' ways as well as assists in active health administration if dosage is taken in a proper way (Fan et al., 2020).

*Eucalyptus camaldulensis* Dehnh. reported to be used for cough and cold by boiling the plant leaf and inhaling the steam other studies reported same result as the leaves of this plant have been reported to be utilized in case of various disorders, including as many respiratory disorders like nasal sinus disorder and cough (Harkat-Madouri et al., 2015). From various parts of this plant such as leaves, stem, roots, seed, and fruits chemicals were examined including enrich amount of tannins in both ethanol and aqueous distillate, which were observed to have curative properties and tannins were considered to contain great therapeutic value and moreover carry out various anti-microbial activities (Haslam, 1996). It has been reported that whole parts of *Eucalyptus camaldulensis* Dehnh plant are utilized against various viral and bacterial disorders with considerable biological properties (Hafsa et al., 2016).

*Allium sativum* L. exhibit sulfer exhibiting phytochemicals such as protein, polyphenol and sulfoxide that have antiviral activities and boost up immune system (Anywar et al., 2020; Sahoo & Banik, 2018). The flavonoid constitutes of *Allium sativum* L. have high preventive activities against viral reproduction, as well as it has been demonstrated that flavonoid compounds can stop the formation of genetic material and protein in virus, that in addition reduce other viral contagion such as influenza A and B further more active against other viruses such as herpes simplex virus 1, herpes simplex virus 2, viral pneumonia, rotavirus, cytomegalovirus, rhinovirus, and HIV. In addition, it has been examined that it also has great influence in reducing the spread of common cold virus (Venu & Austin, 2020).

It has been reported that the medicinal plant *Solanum nigrum* L. contain methanol and chloroform residues that can prevent Hepatitis C Virus against NS3 protease into the liver cells. The activities of NS3 protease were reduced by the chloroform residue in a

dosage dependency way (Javed et al., 2011).

**Table.5** List of medicinal plants with active phytochemicals curative for COVID-19 symptoms.

| S. NO | Botanical name | Local name | Family | Life form | Part used | Disease treated | Preparation mode | Phytochemicals | References |
|---|---|---|---|---|---|---|---|---|---|
| 1 | *Achillea abrotanoides* (Vis.) Vis. | Bohe madran | Asteraceae | Herb | Seed and flower | Fever | Decoction | Asparagin, Coumarins, Essential oils, Flavonoids, Isovalerianic acid, Salicylic acid, Sterols, Tannins | (Candan et al., 2003) |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 2 | *Achillea millefolium* L. | Brinjjask | Asteraceae | Herb | Flower, leaf | Diarrhea, vomiting and fever | Decoction | **Three flavones:** 5-Hydroxy-3,6,7,4′-tetramethoxyflavone, artemetin, and casticin, Two sesquiterpene lactone-esters, and one sesquiterpene lactone-diol, **Guaianolides:** Leucodin, 8α-angeloxy-leucodin, achillin, 8α-angeloxy-achillin, and desacetylmatricarin, Three phenolic glycosides: Luteolin 7-O-glucoside, apigenin 7-O-glucoside, and caffeic acid glucoside. | (Flak et al.,1975; Farook et al., 2012; Glasal et al., 2003; Yassa et al., 2007) |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 3 | *Allium sativum* L. | Serk | Amaryllidaceae | Herb | Tuber | Teeth infection | Cooked in sarsoo oil | Aqueous, methanolic, and ethanolic extracts and isolated compounds such as alliin, allicin, etc., | (El-Saber Batiha et al., 2020; Szychowsk et al., 2018) |
| 4 | *Argemone ochroleuca* Sweet | Kalajirree | Papaveraceae | Herb | Seed | Cough ,chest problem ,stomach pain and ear infection | Decoction, powder | alkaloids like Isoquinolines, from where compounds as Alocryptopine, Protopine | (Haisova, K., Slavik, J. 1975) |
| 5 | *Azadirachta indica* A.Juss. | Shreesh | Meliaceae | Tree | Leaf | Head ach, breast cancer | Powder | zadirachtin, Nimbidin, Nimbin, Nimbolide, Nimbic acid | (Baharek et al., 2014) |
| 6 | *Carica papaya* L. | Papetha | Cariceae | Tree | Fresh leaf | Dengue fever | Juice | Caricaxanthin, violaxanthin, zeaxanthin, carpaine, dehydrocarpaine I and II and cardenolide | (Kala, 2012; Pandey et al., 2016; Radhakrish nan et al., 2017) |
| 7 | *Citrus medica* L. | Trunj | Rutaceae | Shrub | Friut, leaf | Hepatitis C and tumor | Juice, Raw leaf | flavonoids, saponins, and tannins in methanol extracts | (Shojaemeh r et al., 2020) |

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|---|---|---|---|---|---|---|---|---|---|
| 8 | *Cocculus pendulus* (J.R. & G. Forst) Diels | Zamur | Menispermacea | Shrub | Leaf | Head ach, red and itchy eyes | powder | siddiquine, penduline, tetradine, isotrilobine, siddiquamine, kohatine, telobine, pateline, kurramine, isotrilobine and tricordatine, | (Jangir et al., 2016) |
| 9 | *Dodonaea viscosa* (L.) Jacq. | Anartrik | Spaindaceae | Shrub | Leaf , flower, seed | Diarrhea , skin burn , chest infection | Decoction , infusion , past, | Alcohol and aqueous extracts of roots Methanol extract (80%) extracts of the leaves Kaempferol methyl ethers and 3,4',5,7-tetrahydroxy flavone (kaempferol) from leaf | (Rajamanickam et al., 2010; Getie et al., 2003; Teffo et al., 2010) |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 10 | *Eucalyptus camaldulensis* Dehnh. | Baam | Myrtaceae | Tree | leaf | Cough, cold | Steam | Tannins, Saponins Glycoside, steroids. | (Sani et al.,2014; Adeniyi et al. 2015; Abu-Jafar and Huleihel 2017); |
| 11 | *Fagonia a rabica* L. | Shurdo | Zygophyllaceae | Herb | Bark | Cough, old fever | Decoction | tannins and flavonoids, alkaloids, saponins, terpenes and glycosides | (Syed et al., 2013) |
| 12 | *Ficus carica* L. | Injeer | Moraceae | Tree | Fruit | Cough | Decoction | Terpenoids, anthocyanins, steroids | (Idolo et al., 2010; Patil et al., 2010c) (Aref et al., 2011a, b) |
| 13 | *Foeniculum vulgare* Mill. | Raz | Apiaceae | Herb | Seed | Mouth canker, chest problem, acidity, stomach ach | Powder | Saponins, flavonoids, cardiac glycosides, sterols, triterpenes, coumarins, proteins, volatile oils, trace elements and vitamins; | (Al Snafi, 2018) |

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|---|---|---|---|---|---|---|---|---|---|
| 14 | *Peganum harmala* L. | Ispondan | Nitrariaceae | Herb | Seed | Cough, tumor,Stomach problems, eye injury | Decoction (Boiled for cough and stomach) / powder for tumor | Alcoholic extract | (Moradi et al., 2017) |
| 15 | *Plantago lanceolata* L. | Areegosh | Plantaginaceae | Herb | Seed/ leaves | Cough, chest pain, fever | Decoction, Raw | flavonoids, coumarins, cinnamic acid content, and phenol | (Abate et al., 2022) |
| 16 | *Plantgo major* L. | Areegosh | Plantaginaceae | Herb | Seed, leaves | Cough, chest pain, fever | Decoction, Raw | Caffeic acid, chlorogenic acid | (Chiang et al., 2002) |
| 17 | *Psammogeton biternatum* Edgew. | Izbothk | Apiaceae | Herb | Seed | Body pain, head ach, paralysis, breast cancer | Decoction , cooked | alkaloids, phenols, flavonoids, terpenoids and cardiac glycosides | (Riaz et al., 2012). |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 18 | *Rhazya stricta* Decne. | Aeshark | Apocynaceae | Shrub | Fresh leaves/ root powder | Body heat removal, increase hair growth, Fever, teeth infection, stomach warm, mouth canker, piles, | Paste /powder for canker and piles used, | Alkaloids: Akuammidine, Aspidosespermidine, flavonoids: Rhazianoside A, Rhazianoside B, Glycosides Triterpenes | (Bashir et al. 1994) |
| 19 | *Solanum nigrum* L. | Tholangoor | Solanaceae | Herb | Fruit, leaf | Teeth warms, cough | Raw / decoction | Alkaloids, Saponins, polyphenols, tannins, terpenoids, Solasolidine | |
| 20 | *Trichodesma africanum* (L.) Sm. | Charmahing | Boraginaceae | Herb | All parts | Cough, chest problem | Decoction | steroids, coumarins, flavonoids, phenolics compounds, alkaloids,glycosides, carbohydrates and saponins | (El Moaty, 2009). |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 21 | *Zataria multiflora* Boiss. | Izgind | Asteraceae | Herb | Leaf and seed | Cough, flue, chest problem, old fever, Measles | Decoction, smoke | Essential oil contain phenolic (thymol, carvacrol and linalool) and non-phenolic (p-cymene, γ-Terpinene and α-Pinene) ingredients, flavonoids (pigenin, luteolin and 6-hydroxyluteolin), tannins, resins and saponins | (Ali et al., 2000; Gupta & Gupta, 1972; Sajed et al., 2013). |
| 22 | *Zingiber officinale* Roscoe | Zanjabeel | Zingiberaceae | Herb | Root | Cough and flue | Decoction | ingerol, Shogaols, Paradol, Zingerone | (Gyawali et al., 2020) |

## CONCLUSION

This current research work documented the knowledge about the medicinal plants used for the treatment of symptoms of COVID-19 and other diseases by local people of district Panjgur, Balochistan. A sum of 113 people of Panjgur were interrogated. The informant's ages were approximately between 25-70 years old. A sum of 72 medicinal plant belonging to 37 families with local names of plant species, their uses, part used, preparation mode and dosage were reported. In this study area herbaceous life form composed the highest rank of therapeutic plants to be used for treatment of variety of ailments. Majority of plants were reported to be utilized for cure of gastrointestinal diseases and respiratory disorders. In this study five plants were reported to be used for treatment of COVID-19 cough *Zingiber officinale* Roscoe, *Zataria multiflora* Boiss, *Trichodesma africanum* (L) Sm, *Pantago lanceolate* L, *Plantago major* L. The *Pulicaria undulata* (L.) C.A.Mey. plant was reported for the first time which was being used to cure Diarrhea. It is suggested to perform pharmacological studies on these medicinal plants and find active phytochemicals effective for specific ailments. This study provide basis for the preservation plant species. Further this study particularly contribute to the conservation of traditional knowledge for the future generation as this traditional knowledge is disappearing day by day.

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