

IMMUNITY BOOSTING MEDICINAL PLANTS TO BEAT COVID -19 IN SERAJ BLOCK OF MANDI DISTRICT, HIMACHAL PRADESH

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ARTICLE INFO

Received: 29 August 2021
Revised: 06 November 2021
Accepted: 08 November 2021

Keywords:

COVID-19, Immunity Boosting, Medicinal Plants, Seraj Block.

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ABSTRACT

Purpose: This study aimed to document the present status of medicinal plants used to boost the immunity to combat Coronavirus.

Materials and Methods: For the assessment and use of herbs during the COVID 19 pandemic, surveys were conducted in different villages of Seraj block. The surveys were conducted during the spread of the pandemic from 2020 to 2021. Local people were interviewed and information on the utilization of local herbs during this pandemic was recorded. Information on parts used, the procedure of use, habit, habitat, etc. was also collected.

Results: A total of 58 species of medicinal plants from 27 families and 42 genera were documented. Among them, the most dominant family was Rosaceae. Most of the plants such as *Morchella* sp, *Naustrium officinale*, *Taraxacum officinale*, *Urtica dioica*, *Allium* sp, *Withania somnifera*, *Curcuma longa*, *Cannabis*, *Mentha*, *Ocimum sanctum* are rich in antioxidants and have a wide range of medicinal values used to treat cough, cold, fever, and bronchitis. All these plants were used traditionally to boost immunity. Due to the covid -19 pandemic, the utilization of these herbal plants has increased many folds in the area. These medicinal plants should be made available to scientists to design clinical trials. Integration of this concept would certainly develop drug therapy in the near future.

Conclusion: The study found that the use of medicinal plants has increased during COVID-19 and most of the respondents recommended medicinal plants to prevent COVID-19 and to boost immunity. More studies should be conducted to develop certain formulations.

INTRODUCTION

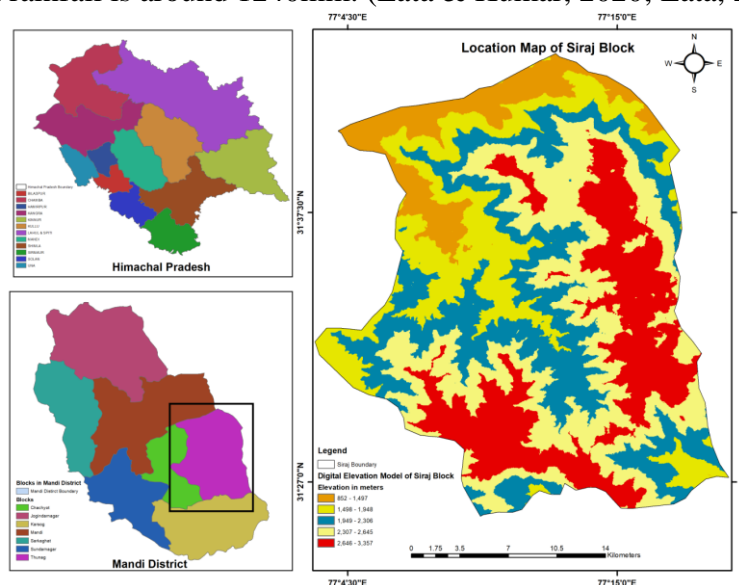
The Indian Himalayan Region (IHR) covers approximately 4,19,873 km² area (Rodgers & Panwar, 1988), and covers 10 states namely, Jammu & Kashmir, Himachal Pradesh, Uttarakhand, Sikkim, Arunachal Pradesh, Meghalaya, Nagaland, Manipur, Mizoram, Tripura, and hill regions of 2 states viz. Assam and West Bengal of Indian Republic. The study was carried out in the Seraj block of District Mandi Himachal Pradesh. Due to diverse habitats and large altitudinal range (2000-3500), it supports unique and socio-economically important floristic diversity. It has also been playing an important role in increasing the economic level of people as Seraj exports medicinal plants to different parts of the country and world. The elder people living in rural areas have more knowledge of traditional medicine. The new coronavirus disease (COVID-19) pandemic has caused global socioeconomic disturbances with a worrisome number of deaths and health issues, and the world has been struggling to find medicine to treat

and prevent COVID-19 (Raghuvir, 2000). A number of combinations and trials have been done, but so far, they have not produced promising results (Boulware et al., 2000). There is a strong inter-relationship between people and plants according to needs. People are dependent on plants for different purposes such as for food, medicine, and houses. Plant species have always been a fundamental source for the discovery of drugs. People had used medicinal plants to fight against pandemics in the past (Arora et al., 2011), and dependency of people on medicinal plants might have increased these days around the world as medicinal plants can be an alternative option to prevent COVID-19. Therefore, this study presents an examination of some medicinal plants that can be used to combat coronavirus. Different researchers have suggested herbal medicine as a potential option to cure or prevent COVID-19 (Vellingiri et al., 2020). Countries like China and India are integrating their use with western medicine to boost the immunity power of COVID-19 patients. On the other hand, the World Health Organization (WHO) (2020) claims medicinal plants might be good for the health and in supporting the immune system, but not in preventing or curing COVID-19.

METHODOLOGY

Study area

Himachal Pradesh ($30^{\circ} 22' 40''$ to $30^{\circ} 12' 40''$ N latitudes and $75^{\circ} 47' 55''$ to $79^{\circ} 04' 20''$ E longitudes) is a Northwestern Himalayan state of India which is a rich repository of ethnomedicinal flora. Most of these plant species find their use in traditional medicine, folk uses, and also in modern industry (Singh & Thakur, 2014; Kumar & Jamwal, 2021). The present study was carried out in Seraj block of district Mandi ($31.5892^{\circ}\text{N}, 76.9182^{\circ}\text{E}$) Himachal Pradesh. The total population of the Seraj block is 1,06,444 with 469 Villages and 59 Panchayats (Statistical Department Mandi). The area is covered by a dense forest of conifers and oak trees. This area is rich in medicinal flora. Soil is fertile and rich in humus and nitrogenous compounds but lacks phosphate compounds. The major soil groups are brown hill soil and red loamy soil. Most soil in this region is acidic in nature. Being a hilly valley climate is cool and temperate with three distinct seasons; winter (October to March), summer (April to June), monsoon (July to September). The highest temperature is recorded during May and June varying between 30 to 35. The lowest temperature is recorded during December and January month. The annual rainfall is around 1240mm. (Lata & Kumar, 2020; Lata, 2020).



Methodology

For the assessment and use of herbs during the COVID 19 pandemic, surveys were conducted in different villages of Seraj block, namely Shilibagi, Cheung, Didier, Suragi, Chendi, Keuli, Lambatach, Bakhilwar, Jarol, Kothi, Rod, Chapper, Majakhal, Kutah, Dhanshali, Tungadhar, Bhanvas, Danhyar, Kataru, Sanglwara, Dusadhi, Dhrut, Kheladhar, Ropa, Surah, Murag. Surveys were conducted during the spread of the pandemic from 2020 to 2021. Local people were interviewed and information on the utilization of local herbs during this pandemic was recorded. The interviews were mostly individual. Interviews followed the informal method and open-ended rather than a strict questionnaire. The language used while interacting with the informants was the local dialect of the study area viz. Pahari and in certain cases, Hindi also. Information on parts used, the procedure of use, habit, habitat, etc. was also collected.

Table 1: Demographic profile of informants: N=150

Parameter	Description	Total Respondents	Frequency %
Age	21-30	12	8%
	31-40	32	21.3%
	41-50	27	18%
	51-60	29	19.3%
	61-70	34	22.7%
	71-80	16	10.7%
Sex	Female	80	53.4%
	Male	70	46.6%

RESULTS AND DISCUSSION

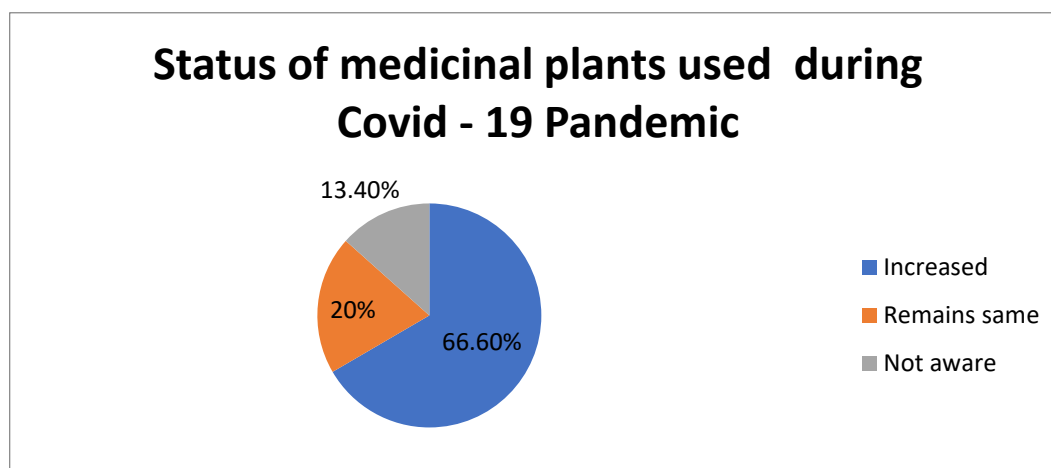


Fig :1 Status of medicinal plants used

Out of 150 respondents, 100 (66.6%) respondents agreed that the use of the medicinal plant has increased during COVID-19, whereas 30 (20 %) agreed the use of medicinal plants during COVID-19 is the same as that of normal condition, 20 (13.4%) respondents were not aware.

Table 2: Immunity-boosting medicinal plants to beat COVID -19 in Seraj Block of District Mandi.

Family/Taxa	Local Name	Altitudinal Range (m.)	Life Form	Part Used	Nativity	Indigenous Use by inhabitants
Angiosperm						
Amaranthaceae						
<i>Achyranthes aspera</i> L.	Putkanda/ Umalkudi	1800-2500	H	Lf	As Trop	Leaves cooked to make sag.
Anacardiaceae						
<i>Pistacia chinensis</i> subsp. <i>integerrima</i> (J. L. Stewart ex Brandis) Rech. f.	Kakare/ Kakar singhi	1800-2200	T	Fr	Reg Himal Egypt Persia	Fruits are burn in the fire and powder are consumed during persistent cough.
<i>Rhus javanica</i> L.**	Titri	1800-2200	T	Fr	Reg Himal	Fruits are eaten.
Apiaceae						
<i>Chaerophyllum reflexum</i> Lindl.	Khelti	2100-3369	H	Rt	Reg Himal	Roots are used for salad and vegetables.
<i>C.villosum</i> Wall. ex DC.**	Jangli gazar	2500-3369	H	WP	Reg Himal	Roots are used for salad and vegetables.
<i>Heracleum candicans</i> L.	Badiyacha	1800-2800	H	Lf, Rt	Reg Himal	Stem and root are eaten.
Alliaceae						
<i>Allium humile</i>	Lahne	2000-3000	H	Bl, Lf.		Raw soaked in water,Dried, boil with water,leaves cooked ,eaten as salad
Amaryllidaceae						
<i>Allium sativum</i> L.	Lasun	1500-3000	H	Bl Lf		Raw soaked in water,Dried, boil with water
<i>Myriactis nepalensis</i> Less.	-	1800-3369	H	Lf	Reg Himal As Centr	Leaves and young shoots are cooked. Roasted fruits are pickled also.
<i>Taraxacum officinalis</i> Webb.	Gahri phool	1800-2800	H	WP	Am Trop	Leaves cooked as vegetables. Leaves are eaten as a raw in soup or salad
Balsaminaceae						
<i>Impatiens glandulifera</i> Royle	-	2200-3369	H	Sd, Fl	Reg Himal	Seeds, young leaves, shoots are cooked and eaten. Flowers are turned into a jam.
<i>I. racemosa</i> Hk. f.**	-	1800-2700	H	Sd, AP	Reg Himal	Leaves and young shoots are cooked. Seeds are consumed raw or cooked.
<i>I. scabrida</i> DC.**	-	1800-2600	H	Sd, WP	Reg Himal	Aerial parts cooked and consumed as vegetables.
<i>I. sulcata</i> Wall.**	-	2000-3369	H	Sd, AP	Reg Himal	Seeds are pickled and aerial parts cooked.
Berberidaceae						
<i>Berberis aristata</i> DC.**	Kasmal	1800-2800	Sh	WP	Ind Or	Ripe fruits are eaten
<i>B.jaeschkeana</i> Schneid.**	Kasmal	2700-3369	Sh	Rt, Fr	Reg Himal	Ripe fruits are eaten
<i>B. lycium</i> Royle**	Kasmal	1800-2200	Sh	Fr	Reg Himal	Ripe fruits are eaten
Brassicaceae						
<i>Nasturtium officinale</i> R.Br.	Chucch	2000-3000	H	Lf	-	Leaves and tender twigs are cooked as vegetable or eaten as raw in the form of salads.
Cannabaceae						

<i>Cannabis sativa</i> L.	Bijya	1800-2000	H	Lf, Sd, Fr, Fl	As Centr Reg Himal Bor Occ	Its seeds are grinded and salt is prepared .Seeds are used as a stuffing material for Siddu and Kauchari. Leaf in small quantity are used to make pakora .
Dioscoreaceae						
<i>Dioscorea deltoidea</i> Wall. ex Kunth	-	1800-2800	H	Tu	Ind	Tubers are cooked and eaten.
Elaeagnaceae						
<i>Elaeagnus parvifolia</i> Wall. ex Royle	Geai	1800-2400	T	Fr	Japan	Fruits are edible.
Ericaceae						
<i>Rhododendron arboretum</i>	Burah	2000-3000	T	fl.	Ind Or Reg Himal Zeylan	Flowers are grinded and chutney prepared from them and consumed during summer season. Fresh juice and sharbat are also made from the flowers.
Fabaceae / <i>Trigonella foenum-graecum</i> L.	Methi	1500-3000	H	Sd,lf		Decoction of Seed or leaves used ,seed also added while preparing tea .Seeds are soaked in water and left whole night ,soaked water consumed.
Grossulariaceae						
<i>Ribes glaciale</i> Wall.	-	2800-3369	Sh	Fr	Reg Himal	The ripe fruit is edible.
Hippocastanaceae						
<i>Aesculus indica</i> Coleb. ex Camb.**	Khanor	1800-2600	T	Fr	Reg Himal	Fruits are soaked in water then grinded and flour is obtained which is known as seek .from the seek rotis are made.
Juglandaceae						
<i>Juglans regia</i> L.**	Akhrot	1800-2000	T	Fr	As Occ Reg Himal	Fruits are used as a stuffing material for siddu. After harvesting fruits are dried and stored for future use as a dry fruits. Green leaves and tender twigs are used as a (datun) to clean teeth
Lamiaceae						
<i>Mentha arvensis</i> L.	Pudina	1500-3000	H	Lf	Europe	Powder, boil with water, paste consumed .
<i>Elsholtzia fruticosa</i> (Don) Rehd.	Bothi,	1800-2200	H	Lf, Fr, Sd	Reg Himal	The powdered seeds are used as a condiment for flavouring foodstuffs
<i>Thymus linearis</i> Benth.	Ban jira/madroshda	2000-3369	H	WP	Europe As et Afr Bor	Aerial parts of plants are wrapped with in a cotton cloth and used to foment with hot water or heat, which relieve the stomach ache of infants as well as adults.
<i>Ocimum sanctum</i>	Tulsi	1500-2800	H	WP	Ind sub con	Decoction of leaves ,seeds consumed.Powdered seeds and leaves used in beverages.
Liliaceae						
<i>Polygonatum verticillatum</i> (L.) Al.	Salam-Mishri	2000-3369	H	Tu	Europe As Bor	Its paste is applied on forehead during high fever.
Myrtaceae						
<i>Syzygium cumini</i>	Jamun	2500-3000	T	. Fr	Reg Himal	Ripe fruits eaten as a raw
<i>Ficus nemoralis</i>	Dudla	1800-2000	T	Fr, Lf	Reg Himal	Leaves are cooked as a vegetable.

<i>Morus nigra</i>	Cheemu	1800-2200	T	Fr	Reg Himal	Ripe fruits are very delicious and consumed.
Myricaceae						
<i>Myrica esculenta</i>	Kafal	1800-2500	T	fr	Reg Himal	Ripe fruits are consumed.
Oxalidaceae						
Oxalidaceae <i>Oxalis corniculata</i>	Malori	2500-3000	H	Lf ,fl	Reg Himal	Leaves consumed to make chutney. Infusion consumed .
Polygonaceae						
<i>Fagopyrum debotrys</i> (Don) Hara	Fafra	1800-2800	H	Lf	Reg Himal China	Leaves are edible consumed as green leafy vegetables.
<i>F. esculentum</i> Moench	Oghal	2000-3000	H	Lf	Europe As Bor	Leaves are cooked as vegetables. Seeds are grinded into powder and flour is made which in turn is used to make bread or mixed with wheat flour or others.
<i>Persicaria nepalense</i> Meisn.	Nalora	1800-2000	H	Lf	As et Afr Trop et Subtrop	Leaves and tender shoots are cooked.
Rosaceae						
<i>Cotoneaster microphyllus</i> Wall. ex Lindl.	Chinchri	2000-3369	Sh	Rt, Lf, Fr	Reg Himal	Ripe fruits are eaten.
<i>Fragaria nubicola</i> L.	Ghumpal	2000-3000	H	Fr	Reg Temp	Raw fruits are eaten .They are very tasty with strawberry flavor.
<i>Prinsepia utilis</i> Royle	Bekhal	1800-2600	Sh	Sd, Fr	Reg Himal	An edible oil is obtained from the seed used in cooking.
<i>Prunus cerasoides</i> Don	Paja	1800-2200	T	Fr	Reg Himal	Ripe fruits are edible and its leaves have religious value used to worship the deities .
<i>Pyrus pashia</i> Buch.-Ham. ex Don	Kainth	1800-2200	T	Fr	Reg Himal	Ripe fruits are very delicious and are eaten by inhabitants.
<i>Rosa brunonii</i> Lindl.	Kuja/ Shami	1800-2200	Sh	Fr	Reg Himal China	Fruits are eaten.
<i>R. sericea</i> Lindl.	-	2000-3369	Sh	Rt, Fr, Fl	Reg Himal	Fruits and seeds are eaten.
<i>Rubus biflorus</i> Buch.-Ham. ex Sm.	Akhaey	1800-2500	Sh	Fr	Reg Himal	Ripe fruits are edible
<i>R. foliolosus</i> D.Don	Akha	2700-3369	Sh	Fr	Reg Himal	Ripe fruits are edible, rich source of vitamin C.
<i>R. niveus</i> Thunb.	-	1800-2600	Sh	Fr	Reg Himal	Ripe fruits are edible, rich source of vitamin C.
<i>R. paniculatus</i> Sm.**	Kalanche, Kala akha	1800-2600	Sh	Fr	Reg Himal	Ripe fruits are edible
Saxifragaceae						
<i>Astilbe rivularis</i> Buch.-Ham. ex Don	-	1800-2800	H	Lf	Reg Himal	Young leaves are edible and cooked.
Solanaceae						
<i>Withania somnifera</i>	Ashwagandha	1200-2500	H	Lf	Europe	Decotation of Leaf, powdered, tea prepared.
Taxaceae / <i>Taxus baccata</i>	Rakhal	2500-3000	T	If	Reg Himal	Decoction of leaves used ,dried ,powdered ,tea prepared.
Urticaceae						
<i>Urtica dioica</i> Jacq. ex Wedd.	Kugshi	1800-2300	H	Lf	Reg Bor Temp	Tender leaves are chopped, cooked and consumed as a vegetable. Leaves are used to make chutney.
Vitaceae						

<i>Parthenocissus semicordata</i> (Royle) Planch.**	Kramru	1800-2600	Sh	Fr	Ind Or	Sweet Juicy fruits are consumed.
Zingiberaceae <i>Curcuma longa</i>	Haldi	1500-3000	H	Rz		Boil with water or milk, raw, powder taken with water or milk
Fungi						
Morchellaceae						
<i>Morchella comica</i> Pers.	Guchhi/Dunglu	1800-3000		Frb	-	Fruiting bodies are cooked and eaten.
<i>M. esculenta</i> (L.) Pers.	Guchhi/Dunglu	1800-3000		Frb	-	Fruiting bodies are dried and sold in the market due to its high commercial value. It is also consumed as a vegetable.
<i>Gyromitra esculenta</i> (Pers.) Fr.	Ban Dunglu/Guchhi	2500-3300		Frb		Fruiting bodies are cooked and eaten as a vegetable. It is known for its delicacy.

Abbreviations used: AR=Altitudinal range; H = Herb; Sh = Shrub; T = Tree; AP= Aerial part; Bk= Bark; Fl= Flower; Fr= Fruit; Infl= Inflorescence; Lf=Leaf; Rh= Rhizome; Rt= Root; Sd= Seed; St= Stem; Tu= Tuber; WP= Whole plant; Wd= Wood; Res= Resin; Frd= Frond; Frb= Fruiting body; La=Latex; Afr = Africa; Am =America; As =Asia; Austr =Australia; Bor =Borealis; Centr =Central; et =And; Geront =Gerontia; Himl=Himalaya; Ind=Indian; Occ =Occidentalis; Or= Oriental; Orient =Oriental; Reg=Region; Subtrop =Subtropical;Temp =Temperate; Trop =Tropical; * =Endemic and ** =Near Endemic

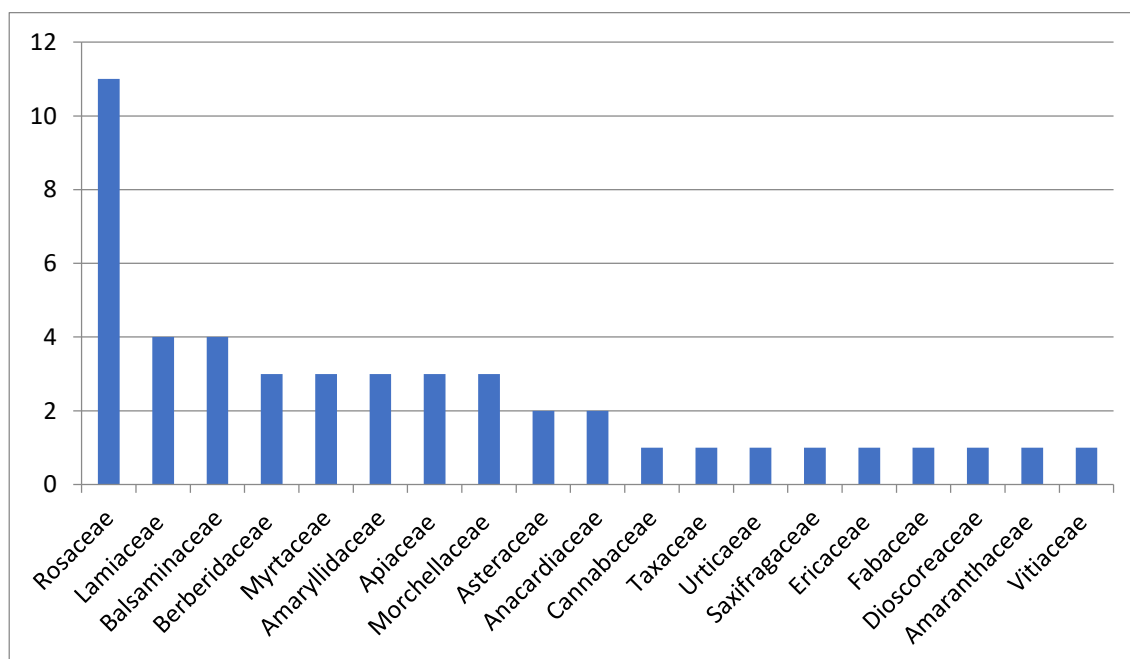


Fig 2: Families recorded.

Results and Discussion

A total of 58 species of medicinal plants from 27 families and 42 genera were documented. Among them, the most dominant family was Rosaceae and 11 others include Amaranthaceae 1, Anacardiaceae 2, Amaryllidaceae 3, Apiaceae 3, Asteraceae 2, Balsaminaceae 4, Berberidaceae 3, Brassicaceae 1, Cannabaceae 1, Dioscoreaceae 1, Elaeagnaceae 1, Ericaceae 1, Fabaceae 1, Grossulariaceae 1, Hippocastanaceae 1, Juglandaceae 1, Lamiaceae 4, Liliaceae 1, Morchellaceae

3, Myrtaceae 3, Myricaceae 1, Oxalidaceae 1, Polygonaceae 3, Solanaceae 1, Taxaceae 1, Saxifragaceae 1, Vitaceae 1, Urticaceae 1.

Most of the plants such as *Morchella sp*, *Naustrium officinale*, *Taraxacum officinale*, *Urtica dioica*, *Allium sp*, *Withania somnifera*, *Curcuma longa*, *Cannabis*, *Mentha*, *Ocimum sanctum* are rich in antioxidants and have a wide range of medicinal values used to treat cough, cold, fever, and bronchitis. Ripe fruits of *Rubus sp*, *Berberis Lycium*, *Elaeagnus parvifolia*, *Ribes glaciale*, *syzium cumini*, *Rhododendron arboretum*, *Oxalis sp*, *Morus nigra*, *Myrica esculenta*, *Pyrus pashia* are loaded with Vitamin A, C, and minerals like Mn, Zn, Mg, etc. All these plants were used traditionally to boost immunity. Due to the covid -19 pandemic, the utilization of these herbal plants has increased many folds in the area. *Achyranthes Aspera*, *Fagopyrum esculentum* and *Fagopyrum debtors* are eaten in processed form (Saag). Juice and chatni are prepared from the flowers of *Rhododendron arboretum* and *Oxalis corniculata*.



Morchella. esculenta



Nasturtium officinale nearby fresh water stream



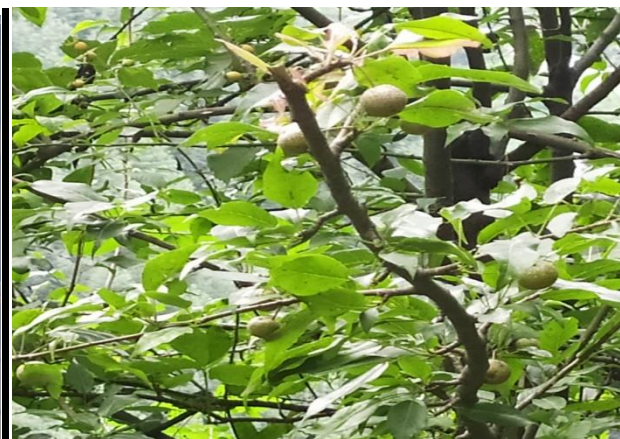
Nasturtium officinale



Rhododendron arboretum



Women using *Thymus linearis*



Pyrus pashia



Ocimum sanctum



Curcuma longa



Immunity booster drink (milk with
haldi powder)



Thymus linearis



Rubus niveus



Berberis aristata



Rubus biflorus



Morus nigra



Myrica esculenta

Syzygium cumini fruit

Immunity boosting plants of the study area.

Ever since the safety and clinical characteristics of traditional medicines have come out, their consumption has been gradually elevating after approval by scientific communities (Sarfraz et al., 2020; Rastogi et al., 2020; Rajagopal et al., 2020; Shankar et al., 2020). Attributable to the side-effects of chemical compounds on to human bodies, it has believed to utilize herbal therapies with much more effectiveness and nil side-effects. Understanding the gravity of the situation and health crises, it is the responsibility of the scientific community to look for alternatives or techniques to develop viral vaccination against COVID-19 infection. Having a healthy lifestyle, natural food products can boost the immune functions of the body to combat the severity of viral infections. While improving the immune responses, they also provide resistance against pathogenic organisms (Read., Obeid., Ahlenstiel, Ahlenstiel, 2019; Adhikari et al., 2019; Khadka et al., 2021). Zinc is one of the indispensable elements which has a significant role in the modulation of growth and development and the regulation of the immunomodulatory responses (Kunwar et al., 2019; Prajapati & Kumar, 2020; Mohammadi & Shaghghi, 2020). Deficiency in the Zn results in enhanced vulnerability to microbial infections specifically viral.

CONCLUSION

The study found that the use of medicinal plants has increased during COVID-19 and most of the respondents recommended medicinal plants to prevent COVID-19 and to boost immunity. However, there is an urgent need to conduct more studies to come up with appropriate doses and formulations for discovering drugs or vaccines from these formulations. For this purpose, scientific evidence and comprehensive pharmaco-dynamic knowledge related to medicinal plants should be made available to scientists to design clinical trials. Integration of this concept would certainly develop drug therapy in the near future.

ACKNOWLEDGEMENTS

The authors are thankful to the inhabitants of the area for their kind help and for providing valuable information during the field surveys.

CONFLICTS OF INTEREST

There are no conflicts of interest

FUNDING

No funds were received for completing this study.

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