Ethnobotanical Survey of Important Wild Medicinal Plants of Tehsil Gojra, District Toba Tek Singh, Punjab, Pakistan

Muhammad Tufail, Khalid Hussain, Khalid Nawaz, Khizar Hayat Bhatti, Ghulam Yasin and Syed Saqib Ali

Databases and Inventories

Abstract

Background: Almost every region of the world is stacked with a large number of medicinal plants. Medicinal plants are the major source to cure many diseases among the peoples of the world. There are still many areas in the world which have not been explored for its flora. Pakistan is also a rich with variety of flora but still there are some areas which need to be studied. This study was conducted to enlist the wild ethnomedicinally important plant species and traditional medicinal knowledge of Gojra, district Toba Tek Singh, Punjab, Pakistan.

Methods: Field surveys were arranged to enlist the important medicinal plants and traditional knowledge from the local community through questionnaire and group discussion during 2019-2020. Data collected through questionnaire was consist of plant local name, medicinal use, method of use and part used.

Results: There were more than 100 plant species including cultivated and wild but only 47 wild plants species were ethnomedicinally important as reported by local respondents that were placed in 20 families. It was noted that leaves had highest percentage (54%) of its use in various prescriptions. *Acacia modesta* Wall. (Fabaceae) was the most common tree used in teeth pain and gastritis with 0.73 UV (Use Value) and 0.075 RFC (Relative Frequency of Citation) values. *Achyranthes aspera* L. (Amaranthaceae) showed 0.85 UV and 0.088 RFC values and was used to cure fever, asthma and cough. For stomach, gastric and urinary disorders, *Chenopodium album* L. (Amaranthaceae) was used with 0.78 UV and 0.156 RFC values. *Cichorium intybus* L. (Asteraceae) has much importance in summer season as it is commonly used to reduce thirst in hot weather conditions. Its UV was 0.74 and RFC was 0.132. Leaves, fruits and barks of *Dalbergia sissoo* DC. (Fabaceae) was used to control nosebleed, gonorrhoea, stop vomiting and skin disorder. It has 0.72 UV and 0.075 RFC values. *Eucalyptus globulus* Labill. (Myrtaceae) was used to treat common cold, respiratory infections and asthma. Its leaves were used to provide steam to the asthma patients. It showed 0.76 UV and 0.08 RFC values. *Ricinus communis* L. (Euphorbiaceae) was a common weed in the area with 0.74 UV and 0.19 RFC values. Its seeds and leaves were useful to treat rheumatic pain, joint pain and constipation. *Acacia modesta* showed the highest Fidelity Level (FL) value that was 87% and used in teeth and gastric problems.

Conclusions: It was concluded that there are many useful wild plants in Tehsil Gojra, district Toba Tek Singh, Punjab, Pakistan that are used in traditional medicines to cure many diseases. These plants also showed pharmacological importance that can be utilized to develop medicines.

Keywords: Gojra, ethnobotany, flora, survey

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Background

Ethnomedicinal studies are of great importance to discover contemporary drugs from indigenous medicinal plants (Njoroge et al., 2004). It is the appropriate source to collect the useful medicinal information and documentation (Mahmood et al., 2013). Ethnomedicinal documentation of traditional/

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folk knowledge of native plants have much contributed for many vital drugs discoveries (Gilani and Rehman, 2005). It is estimated that about 25% of herbal drugs in modern pharmacopeia are plant based (Umair et al., 2017). Ethnomedicinal studies showed that almost all the plants reported in any area have medicinal importance. These plants are not only used in folk medicinal but also provide to health care units to manufacture many useful medicines (Njoroge et al., 2004).

Plants are providing reliable therapy since ancient time throughout the world. Almost every region of the world is stacked with a large number of medicinal plants. Pakistan has e great diversity in medicinal plants and people use these plants in various ethnomedicine to cure many diseases (Alamgeer et al., 2018). Pakistan is diverse in weather, terrestrial areas, conventional zones and flora (Hussain et al., 2008). Pakistan has predominantly huge, spotted and various diversity of medicinal plants. Roughly 6000 medicinal plants are verified from Kashmir and Pakistan (Shinwari, 1996). Khan et al. (2019) described that medicinal plants have been used from the very beginning in health care systems and these plants have shown the efficacy in various diseases.

Medicinal plants have not only importance among local community but currently have much more importance in the Western society (Shinwari and Gilani, 2003). In the world about 50,000 plants are used for medicinal purpose (Cunningham, 2014). Most of the rural community depends upon locally available plants to cure many diseases (Hussain et al., 2010). Many researchers have documented the medicinal importance of local flora in various regions of the world including Pakistan (Rehman et al., 2020). Similarly, Ali et al. (2020) studied the important weeds with their medicinal significance of district Gujrat, Pakistan.

The wild medicinal flora of Tehsil Gojra has not been studied. Few studies are available related to weeds of crops. So, there is a need to provide the useful medicinal information of the flora. This study was designed to document the wild flora and its ethnomedicinal values among the local inhabitant of Tehsil Gojra, district Toba Tek Singh, Punjab, Pakistan.

Materials and methods

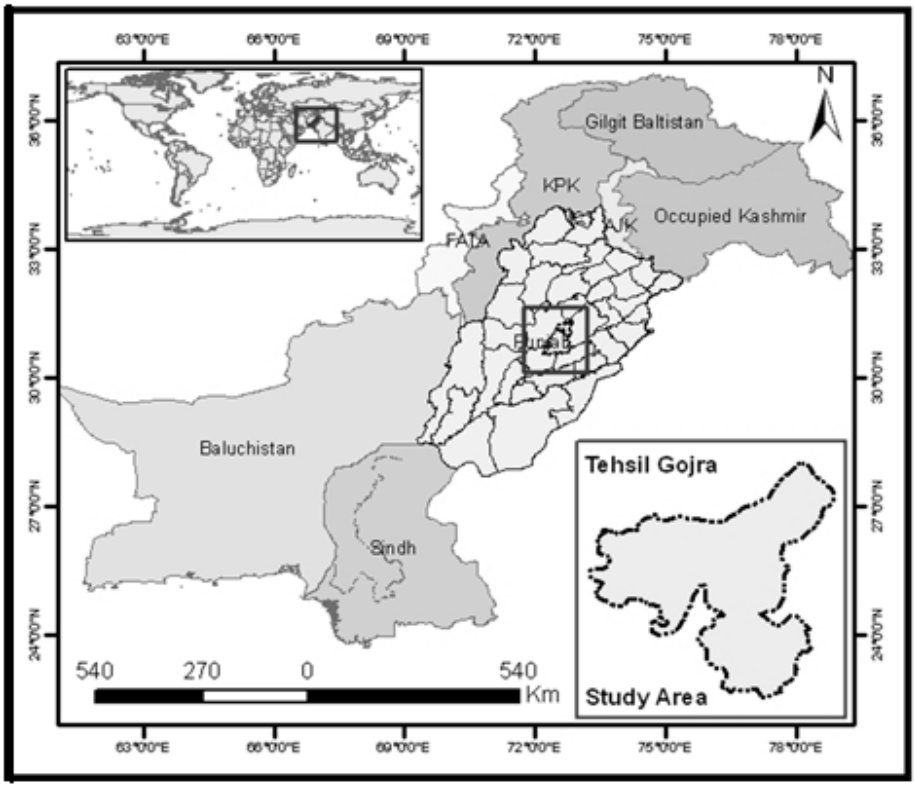
Study site

Present study was conducted in Tehsil Gojra, district Toba Tek Singh, Punjab Pakistan during mid-season of summer and winter of 2019-2020. Tehsil Gojra, district Toba Tek Singh is situated at the latitude of 31°25' N and at longitude of 73°20' E. City is located at 710 ft asl (above sea level). Tehsil Gojra is joined on the eastern side with the district Faisalabad and in the west, it has district Jhang (Figure 1). North of Tehsil Gojra is linked with district Chiniot and in the south with district Toba Tek Singh (Muhammad et al., 2009).

There were total 40 visits and each visit was of 5 days to collect the plants and information from total 20 study sites nearby rural areas where local people depend upon wild plants to cure various diseases. Plants were collected with the help of local guiders who were familiar about the area. Those plants were selected which have mature leaves, stem, roots and preferable flowers. All the wild angiosperm plants were collected and only those plants were further investigated which were used by local people in medicine. The plant samples were collected and dried to mount on herbarium sheets that were identified with distinctive field guiders with their local names. A probabilistic approach was used considering simple and stratified random sampling methods (Levy and Lemeshow, 2008).

Data collection

Information about common name of the plants and part used for a specific disease were collected through interviews and questionnaires. There were 100 respondents (2 % of the local residents) based upon by gender, age and occupation. Respondent were from different age ranging from 20-75 years including male, female and local health providers (hakims). There were 68 male and 32 females respondent with different age group i.e. 18 between 20-30 years of age, 22 between 31-40 years, 20 were 41-50 age group, 17 from 51-60, 17 from 61-70 and 6 respondents were > 70 years of age. Among the respondents, 45% were traditional healers, 40 % laypersons and 15% teachers and other professional. Questionnaire was designed to collect the desired ethnomedicinal information. There were four types main key informant i.e. hakims, plant providers, growers and students that were interviewed for local name, part used, medicinal use and method. Plants were identified with the help of reference plants preserved at herbarium, Department of Botany, University of Gujrat, Pakistan and the collected plants specimens have been deposited in this existing herbarium and further it was cross verified through flora of Pakistan (Nasir and Ali, 1983). Voucher specimens were deposited at Govt. Postgraduate College Gojra.



Map reference: Minallah et al. (2016)

Fig. 1. Map of the study area

Data analysis

Plant parts were arranged into various categories i.e. root, shoot, leaf and flower and data was analyzed using following formulae:

Use Value (UV)

The Use Value (UV) was determined to find relative importance of given species collected from the study area. It was calculated by following formula:

$$UV = \sum U/N$$

In UV formula, U represents the number of citation per specific plant and N represents the number of local informants.

Relative Frequency of Citation (RFC)

RFC was calculated by the given formula:

$$RFC = \frac{FC}{N}$$

In this formula, FC was the number of informants for the use of that species and the N represents the total number of informants in the survey.

Informant Consensus Factor (ICF)

Information of related homogeneity mixture of disease category collected from informants was calculated by following formula:

$$ICF = \frac{Nur - Nt}{Nur - 1}$$

Where, Nur describes the number of use citations from informants for a particular plant-use category and Nt represents the number of species or taxa utilized by all the informants for that specific plant use category. ICF had range between 0 to 1, where ICF value 1 indicated highest level of informant consent and 0 was the lowest value

Fidelity Level (FL)

Fidelity level was used to search out the important advance species related to medicines.

$$FL(\%) = \frac{Np}{N} x100$$

Where, Np for the number of species that is present in specific category. For accurate sum consumption for particular species symbol N was used.

Results

During the present study related to ethnomedicinal values of the wild flora, 100 local inhabitants were interviewed, and information was recorded through questionnaire.

Identification of plant families

There were only 47 important wild ethnomedicinal plant species belonging to 20 plant families in the study area. There were more than 100 plant species including crops and wild plants but only 47 species were documented that were ethnomedicinally important among local community.The families were, Fabaceae, Asteraceae, Poaceae, Amaranthaceae, Moraceae, Euphorbiaceae, Solanaceae, Brassicaceae, Myrtaceae, Convolvulaceae, Malvaceae, Polygonaceae, Oxalidaceae, Apocynaceae, Cyperaceae, Papaveraceae, Portulacaceae, Primulaceae, Zygophyllaceae and Aizoaceae (Figure 2). Families were ranked based upon the number of the species present in the study area. Family Fabaceae was ranked at top with 9 species, Asteraceae and Poaceae with 5 species. There were 4 species of Amaranthaceae and Moraceae and 3 species were belonging to Euphorbiaceae and Solanaceae. All the other families identified in the area had only one species.

Parts used in ethnomedicine

Various parts of the plants i.e. roots, stem, leaves, latex, seeds and whole aerial parts were used to prepare different formulation for medicinal purposes. These parts were used fresh as well dried in different medicines. Drugs were prepared from these plant parts in the form of infusion, extraction, paste powder, decoction, and herbal tea. It was noted that 54% leaves, 32 % fruits, 27% seeds, 31% whole plant, 18 % roots, 10% stem and 2% latex about 1% were used in various prescriptions (Figure 3).

Ethnomedicinal uses

Information related to botanical name, family, UV, RFC, uses, part used, prescription, dosage, form of use and diseases are described in Table 1. It was noted from local informants that all the plants growing in the area have significance in traditional medicines to cure various diseases. Based upon the UV data, most commonly used plants at various locations in the study area were, *A. modesta, A. aspera*, *C. album*, *C. intybus, D. sissoo*, *E. globulus* and *R. communis*.

According to the data, *A. modesta* was a common tree in the area that had 0.73 UV and 0.075 RFC values. Its bark and gum mixed with honey are used in teeth problems, gastric problems. *A. aspera* was used to cure fever, respiratory problem and cough. Its leaves are mixed with honey and black pepper. Plant showed 0.85 UV and 0.088 RFC values.

For stomach, gastric and urinary disorders, people are using *C. album* with 0.78 UV and 0.156 RFC values. *C. intybus* has much importance in summer season as it is commonly used to reduce thirst in hot weather conditions. Its leaves are mixed with sugar to make summer drinks. Its herbal tea is also famous to improve digestion. Its UV was 0.74 and RFC was 0.132. *D. sissoo* was mostly planted tree in the area for shade as well as medicinal importance. Its leaves, fruit and bark are used to control nosebleed, gonorrhea, stop vomiting and skin disorder. It has 0.72 UV and 0.075 RFC values. It was noted that *E. globulus* was used to treat common cold, respiratory infections, asthma and antiseptic. Its leaves are used to provide steam and oil is also applied to the asthma patients. It showed 0.76 UV and 0.08 RFC values.

R. communis was a common weed in the area. Its seeds and leaves are useful to treat rheumatic pain, joint pain and constipation with 0.74 UV and 0.19 RFC values (Table 1).

Pharmacological data analysis

Data for Informant Consensus Factor (ICF) by disease category and Fidelity Level (FL) value for most reported medicinal plants are given in Tables 2 and 3. According to respondent and ICF calculated values, these plants were recommended in many diseases include respiratory diseases, gastric problems, hepatitis, cardiovascular disorders and urogenital problem, kidney and liver disorders, diarrhea, constipation, fever, cold, cough, asthma, flue, bronchitis, vomiting, intestinal problems, arthritis, headache, hypertension, afterbirth problems, gallbladder problems, boils, gynecological disorders, malaria, cancer, paralysis, tumor, allergies, prolapse uterus, male infertility, sexual disorders, piles, snake bite, dropsy, cholera, toothache, rheumatism, stomach problems, gastric problems, intestinal problem, digestive problems, insect bite, body pain, epilepsy, convulsion, infections, nervous disorders, swellings, pneumonia, eye problems, bone pain, joint swellings, jaundice and diabetes (Table 2).

Fidelity Level (FL) value of most reported medicinal plants have been described in Table 3. *A. modesta* showed the highest FL value that was 87% that had used in teeth problems and gastric problems. Similarly, 82% FL value was noted for *C. album* recommend for gastric problems

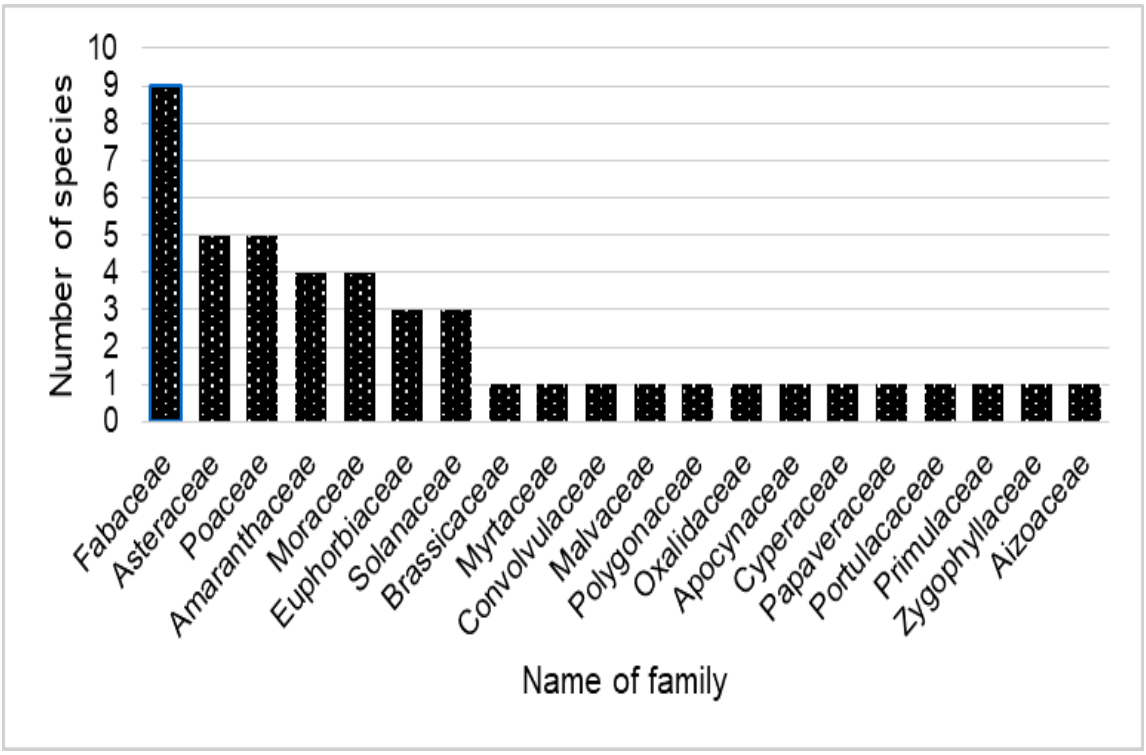


Figure 2. Name of family index with highest number of species used in the study area

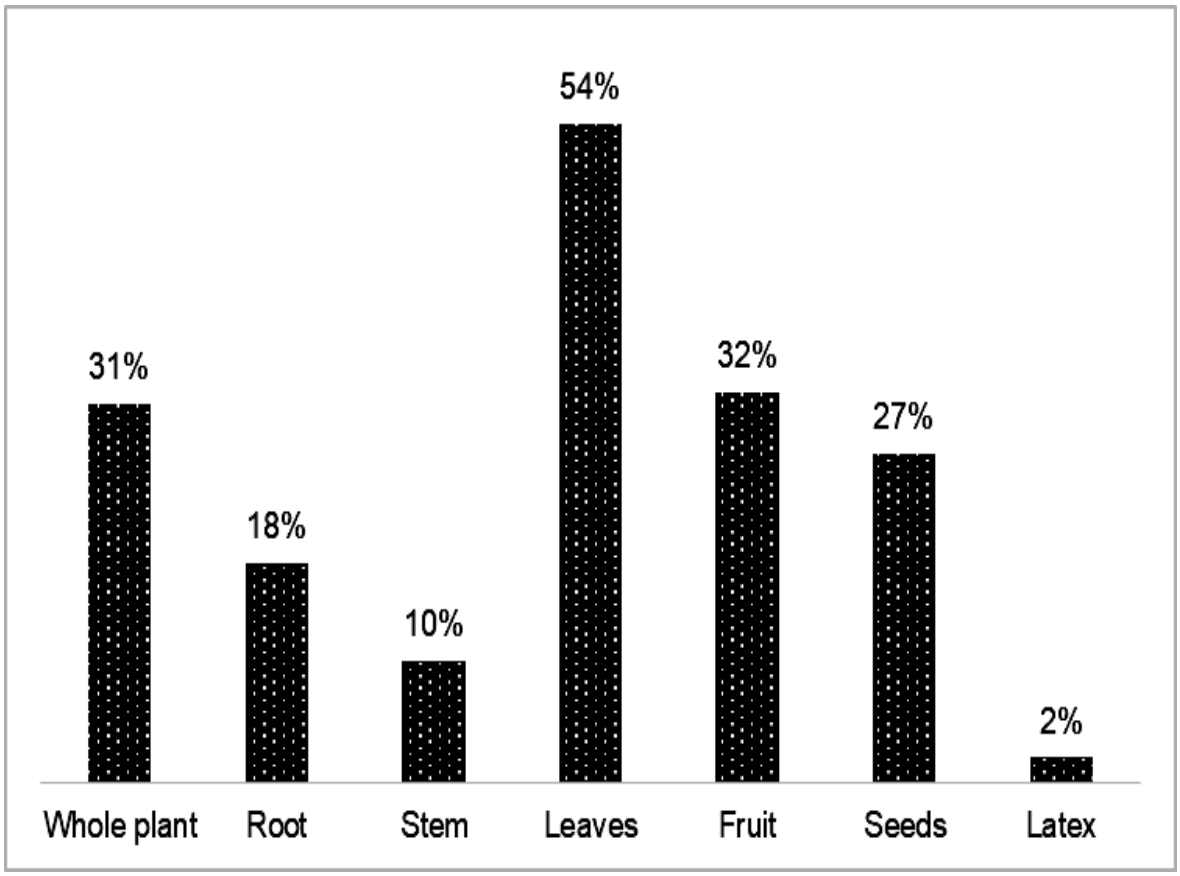


Figure 3. Percentage of plant parts used for medicinal purpose

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Table 1. Description of plants with uses, method and prescription

Botanical Name	Family	Voucher no.	Use value (UV)	Relative Frequency of Citation (RFC)	Uses	Prescription	Application	Time of use	Form of use
Trianthema portulacastrum L.	Aizoaceae	Aiz-03/20	0.54	0.16	Useful for the treatment of constipation, asthma	Plant juice is extracted	Oral	3 times per day	Fresh
Achyranthes aspera L.	Amaranthaceae	Ama-17/20	0.85	0.088	Fever, respiratory problems, cough	Fresh/dry leaves mixed with honey and black pepper	Oral	3 times per day	Fresh/dry leaves
Amaranthus viridis L.	Amaranthaceae	Ama-18/20	0.32	0.043	Insect bite, malaria	Seeds are mixed with rice or honey	Oral	2 times per day	Seeds (dry)
Chenopodium album L.	Amaranthaceae	Ama-14/19	0.78	0.156	Stomach/gastric, and urinary disorders	Leaves mixed with water for kidney disorder(herbal tea)	Oral	2 times per day	Fresh
Chenopodium murale (L.) S. Fuentes, Uotila & Borsch	Amaranthaceae	Ama-15/19	0.61	0.054	Dry cough, pulmonary obstruction	Whole plant part are recommended to rub at chest	External	2 times per day	Dry and fresh
Calotropis procera (Aiton) Dryand.	Apocynaceae	Apo-04/19	0.66	0.16	Snake bite, body pain	Mixed leaves with mustard oil and rubbed	External	3-4 times per day	Dry
Cichorium intybus L.	Asteraceae	Ast-33/19	0.74	0.132	Reduce thirst, improve digestion and liver problem	Fresh/dry leaves to make herbal tea to improve digestion as well as mixed with sugar to make summer drinks	Oral	2 times per day	Fresh/ dry
Cirsium arvense (L.) Scop.	Asteraceae	Ast-34/19	0.43	0.14	Improves digestion and used for child worms	Decoction of roots	Oral	3 times per day	Dry
Eclipta prostrata (L.) L.	Asteraceae	Ast-36/19	0.32	0.12	Useful for curing snake bite. Anti-	Whole plant is mixed with olive oil	Oral	1 time per day	Fresh

					bacterial and anti-oxidant.				
Sonchus asper (L.) Hill	Asteraceae	Ast-43/20	0.34	0.014	Antimicrobial activity, paste is useful to cure wounds	Seeds is soaked in 1 cup water for one night	External	1 time per day	Fresh
Xanthium strumarium L.	Asteraceae	Ast-43/19	0.54	0.18	Anti-inflammatory, antioxidant and antibacterial properties	Leaves are used to make paste	External	1 time per day	Fresh
Lepidium didymium L.	Brassicaceae	Bra-16/20	0.52	0.19	Skin diseases and diabetes, useful for the treatment of gastrointestinal ulcers	Poultice of the leaves is applied	External	2 times per day	Dry
Convolvulus arvensis L.	Convolvulaceae	Con-03/19	0.48	0.06	Cure urinary tract infections and ulcers.	Make juice of roots	Oral	Twice a day	Dry
Cyperus rotundus L.	Cyperaceae	Cyp-04/20	0.23	0.08	Anti-diabetic, anti-inflammatory and antimalarial properties.	Powder of rhizome	Oral	1 time per day	Dry
Euphorbia helioscopia L.	Euphorbiaceae	Eup-18/20	0.53	0.11	Used in constipation, athlete's foot and intestinal problems.	Take its leaves as herbal tea	Oral	3 times per day	Fresh
Euphorbia prostrata Aiton	Euphorbiaceae	Eup-15/20	0.59	0.14	Useful for curing jaundice, fever and kill intestinal worms. Act as anti-inflammatory and anti-bacterial.	Plant part that grows above-ground use to make medicine	Oral	2 times per day	Fresh
Ricinus communis L.	Euphorbiaceae	Eup-21/19	0.74	0.19	Useful for curing rheumatic pain, joint pain and constipation	Seeds and leaves are used to make paste	External and Oral	2 times per day	Dry
Acacia modesta Wall.	Fabaceae	Fab-16/20	0.73	0.075	Teeth problems, gastric problems	Bark and gum mixed with honey	Oral	2 times per day	Dry
Acacia nilotica (L.) Delile.	Fabaceae	Fab-18/20	0.66	0.055	Pyrexia, digestive problems, gonorrhoea, antiseptic, skin infections and blood purification	Flower, bark, seeds, gum twinges	Oral	2 times per day	Fresh/dry

Albizia lebbeck (L.) Benth	Fabaceae	Fab-17/20	0.55	0.043	Lung problems, blood purification abdominal tumours, boils, cough, hernia	Stem, bark or leaves as herbal tea	Oral	1 time per day	Fresh
Dalbergia sissoo DC.	Fabaceae	Fab-22/19	0.72	0.075	Controls nose bleed, gonorrhoea, stop vomiting and skin disorder	Take 2g leaves and fruit and boil it in water	Oral	2 times per day	Fresh
Lathyrus aphaca L.	Fabaceae	Fab-24/19	0.23	0.03	Useful to cure snake bite.	Take 2 spoon of seed and mix with water	Oral	1 time per day	Dry
Medicago polymorpha L.	Fabaceae	Fab-25/19	0.62	0.13	Used to cure kidney, intestinal and bladder infections	Powder of seeds mixed with water to make a mush	Oral	2 times per day	Dry
Medicago sativa L.	Fabaceae	Fab-35/19	0.56	0.22	Body tonic. Enhance metabolism and increase milk production in livestock	Whole plant mixed with oat, alfalfa to make syrup	Oral	2 times per day	Fresh
Melilotus indicus (L.) All.	Fabaceae	Fab-25/20	0.56	0.34	Useful in diarrhea and bowl complaints, intestinal problems.	Seed or whole plant is used to make tablets or dry powder	Oral	1 time per day	Dry
Vicia sativa L.	Fabaceae	Fab-37/19	0.45	0.14	Useful as emollient and have anti-inflammatory and antioxidant properties	Poultice is recommended for skin infection	External	1 time per day	Dry
Malva parviflora L.	Malvaceae	Mal-19/19	0.28	0.12	Antimicrobial, antibacterial and anti-inflammatory properties	Leaf is boiled in 3-4 cup water mixed with cow milk	Oral	Daily in the evening	Fresh
Ficus benghalensis L.	Moraceae	Mor-11/20	0.62	0.031	Cough, flu, Chronic flu & influenza, gonorrhoea, impotencey	Latex, twings. Latex 20g, milk 10g, gum of *Acacia* 20g and *Asparagus* 20g and make tablets	Oral	2 times per day	Fresh or dry
Ficus religiosa L.	Moraceae	Mor-12/20	0.54	0.042	Nervous problems, gonorrhea	Milky latex mixed with honey	Oral	1 time per day	Dry

Morus alba L.	Moraceae	Mor-04/19	0.43	0.08	Useful for treatment of hepatitis, liver diseases	Fruit, root and leaves of are mixed with honey	Oral	1 time per day	Fresh/ dry
Morus nigra L.	Moraceae	Mor-05/19	0.56	0.32	Used for sore throat, respiratory infection	Fruit mixed with sugar and water to make syrup	Oral	2 times per day	Fresh
Eucalyptus globulus Labill.	Myrtaceae	Myr-03/20	0.76	0.08	Common cold, respiratory infections, asthma and antiseptic	Leaves, oil is mixed in water for stream	Oral	1 time par day	Dry/fresh leaves and oil
Oxalis corniculata L.	Oxalidaceae	Oxa-05/19	0.56	0.17	Useful in redness of eye and scurvy, and anti-microbial activity. Useful to cure gastric troubles.	Fresh or dry leaves are used to make powder	Oral	2 times per day	Fresh plus dry
Fumaria indica (Hausskn.) Pugsley	Papaveraceae	Pap-06/20	0.69	0.043	Used in fever, liver problems and diarrhea	Make decoction of leaves with water	Oral	2 times per day	Fresh and dry
Avena sativa L.	Poaceae	Poa-29/20	0.54	0.081	Stomach problems, diabetes	Seeds grind with sugar	Oral	I time per day	Seeds (dry)
Cynodon dactylon (L.) Pers.	Poaceae	Poa-29/19	0.46	0.11	Blood purifier and used in runny nose due to flu	Whole plant paste	Oral and External	2 to 3 times per day	Fresh/dry
Digitaria bicornis (Lam.) Roem. & Schult.	Poaceae	Poa-42/19	0.31	0.23	Useful to kill microbes	Leaves and grinded seeds to make poultice	External	1 time per day	Dry and fresh
Phalaris minor Retz.	Poaceae	Poa-44/20	0.61	0.18	Cure cough, cold, asthma and dysentery	Dry leaves are used to make powder	Oral	1 time per day	Fresh
Saccharum munja Roxb.	Poaceae	Poa-33/20	0.23	0.09	Used during baby birth to control pains	Whole plant is boiled in water	External	Morning time	Fresh
Rumex dentatus L.	Polygonaceae	Pol-12/19	0.61	0.21	Antioxidant, anti-inflammatory and antimicrobial activity. Act as appetizer, cure constipation and diarrhea	Take its leaves grind them and make its juice	External	2 times per day	Dry

Portulaca oleracea L.	Portulacaceae	Por-04/20	0.63	0.27	Recommended in fever, ulcer and abnormal uterine bleeding	Whole plant is used to make poultice	Oral	1 time per day	Dry or fresh
Anagallis arvensis L.	Primulaceae	Pri-03/20	0.34	0.091	Wound healings, skin infections	Fresh leaves to make poultice	External	2 time per day	Fresh as well as dry
Datura metel L.	Solanaceae	Sol-11/18	0.42	0.19	Curing paralyzed portion of the body. Relieve snake bite Cure arthritis and have antimicrobial properties	Take its leaves to make paste	External	2 times per day	Fresh
Solanum nigrum L.	Solanaceae	Sol-14/19	0.62	0.13	Prevent respiratory, hepatic and stomach problems. Cure eye problems, fever, piles and diabetes.	Leaves mixed with honey and other herbs	Oral	2 times per day	Dry
Withania somnifera (L.) Dunal	Solanaceae	Sol-19/20	0.51	0.21	Cure neurological disorders and men sexual health	Roots are used to make herbal tea with milk	Oral	1 time per day	Dry
Tribulus terrestris L.	Zygophyllaceae	Zyg-02/18	0.68	0.23	Used in impotency, men sexual power, body tonic, useful for the treatment of kidney stones and urinary tract infections	Extract of leaves is used and powder of seeds	Oral	1 time per day	Fresh

Table 2. Informant Consensus Factor (ICF) by disease category reported in study area

Disease Category	No. of Use Reports (Nur)	No. of Species Used (Nt)	Nur-Nt	Nur-1	ICF
Nervous disorders, Swellings, Pneumonia, Eye problems	15	9	6	14	0.42
Headache, Hypertension	17	7	10	16	0.62
Afterbirth problems, Gallbladder problems, Boils, Gynecological disorders	19	8	11	18	0.61
Prolapse uterus, Male infertility, Sexual disorders	19	5	14	18	0.77
Insect bite, Body pain, Epilepsy, Convulsion, Infections	19	6	13	18	0.72
Malaria, Cancer, Peralysis, Tumor, Allergies	22	12	10	21	0.47
Respiratory diseases, Gastric problems, Hepatitis	24	10	14	23	0.61
Piles, Snake bite, Dropsy', Cholera, Toothache, Rheumatism	26	13	13	25	0.52
Bone pain, Joint swellings, Jaundice	26	19	7	25	0.28
Jaundice, Malaria, Bronchitis, Vomiting, Intestinal problems, Arthritis	27	15	12	26	0.46
Diabetes	27	13	14	26	0.53
Cardiovascular disorders and Urogenital problem	30	14	16	29	0.55
Kidney and liver disorders	31	13	18	30	0.6
Skin infections, inflammation	87	52	35	86	0.40
Stomach problems, Gastric problems, Intestinal problem, Digestive problems	35	9	26	34	0.76
Loose motion, Constipation	45	20	25	44	0.56
Wound healing, Ulcer, Skin diseases, Tonic	65	38	27	64	0.42
Fever, Cold, Cough, Asthma, Flue	67	37	30	66	0.45

Where, Nur describes he number of use citations from inants for a particular plant-use category and Nt represents the number of species

Table 3. Fidelity Level (FL) value for most reported medicinal plants

Scientific name	Common name	Major ailment	Fidelity level (FL) %
Acacia modesta Wall.	Phulahi	Teeth problems, gastric problems	87
Achyranthes aspera L.	Putkanda	Gastrointestinal disorders and menstrual pain	77
Amaranthus viridis L.	Ghunar	Snake bite	64
Anagallis arvensis L.	Bili booti	Wound healing	76
Calotropis procera (Aiton) W.T.Aiton	Aak	Wound healing	63
Chenopodium album L.	Bathu	Gastric problems	82
Cichorium intybus L.	Kasani	Liver problem, blood purifier	58
Cynodon dactylon (L.) Pers.	Khabbal, talla ghas	Inflammation	38
Eclipta prostrata L.	Bhangra	Snake bite	60
Fumaria indica (Hausskn.) Pugsley	Shahtra	Fever	70
Rumex dentatus L.	Jangli palak	Constipation	63
Solanum nigrum L.	Kainch mainch	Stomach burn	67
Trianthema portulacastrum L.	Itsit	Constipation	76
Vicia sativa L.	Matri	Skin diseases	43

Discussion

Ethnobotanical surveys have much importance to collect the folk knowledge about the medicinal floras that are the basis of various medicines in the world (Ali et al. 2020). Ethnomedicinal flora of any area shows its significance among the local communities as well as it is the major source of raw materials for industries (Njoroge et al., 2004). Wild plants are mostly used as food as well as it is good source of medicines (Abbasi et al, 2016). Weeds of any area have much role in folk medicines. People rely on these wild plants (Rehman et al., 2020). During this study, it was noted that Tehsil Gojra has number of wild plants, which have medicinal significance. There are many wild plants in the area which were reported first time in this study i.e. *Cirsium arvense*, *Digitaria bicornis*, *Lepidium didymium Withania somnifera.* In literature, Muhammad et al. (2009) conducted the study of Tehsil Gojra too but they only described the weeds of wheat crop that had great significance to cure various diseases of Tehsil Gojra, Pakistan. Pakistan has different seasons and variety of soils that's why country is rich with medicinal plants. Many researchers reported the efficacy of those plants in various medicines as reported during this study as Rehman et al. (2020) reported 32 families of weeds and showed the significance of important seasonal weeds growing in district Gujrat, Pakistan against many diseases by local inhabitants.

Ethnomedicinal report of our area is in line with the findings of many other researches carried out in the same area and neighboring areas. It has been described that in most of the areas local community rely on these plants to cure many diseases. The use of these plants is based upon folk knowledge. It was noted that the area has important useful wild flora belonging to various families. Similar results have been found in previous studies as Saurabh et al. (2011) described that *A. aspera* is useful to cure asthma, piles, dropsy, snakebite, rheumatism and skin diseases. *Amaranthus viridis* L. (Amaranthaceae) was useful for the treatment of malaria, useful for prolapse of uterus, cure urinary tract infections, useful to cure snakebite (Butt et al., 2015). During this study, it was noted that *Avena sativa* is considered for having antioxidant and wound healing properties, which is in accordance in the earlier findings found by Akkol et al. (2011). *Calotropis procera* has anti-diarrhoeal and anti-inflammatory activity (Kumar and Basu, 1994). Mishra et al. (2011) described that paste of *Fumaria parviflora var. indica* (Hausskn.) Parsa (Papaveraceae) was useful for curing joint swellings. These fining are in accordance with the information noted during this ethnobotanical survey of Tehsil Gojra.

All the plants documented in this area showed varied values for different pharmacological attributes which have been also observed by many workers in the past. Rehman et al. (2020) conducted study to observe most common medicinal plants by local people were *C. intybus* had 100% Fidelity Level (FL) value as liver tonic and blood purifier. Highest 0.76 Informant Consensus Factor (ICF) values were noted against stomach, gastric, intestinal and digestive problems. *A. aspera* showed the highest Fidelity Level (FL) values that was 93% used gastrointestinal disorders and menstrual pain. Padmavathi et al. (2005) claimed that the high FL value showed the use of a particular species by the local people to treat a specific disease. Rehman et al. (2020) described 33 families with important weeds of the area that are used to cure various diseases including skin infection, respiratory and asthma problems, kidney, liver and heart diseases. Shinwari and Khan (2000) recorded 50 species of herbs belonging to 27 families used medicinally by people native to Margalla Hills of National Park Islamabad. From the total 50 species, only 10 species were being sold in local market. Ahmad et al. (2009) studied six important plant species having medicinal importance. *A. aspera* was one of them, used as purgative, laxative, diuretic, antiviral and styptic agent. Similar medicinal uses were noted among the local people of Tehsil Gojra.

Similarly, Hussain et al. (2008) reported 40 plant species from 39 genera and 32 families having medicinal properties in the Haripur region of Pakistan. They described that *A. arabica* was used as astringent, tonic, antiseptic and purgative. Habiba et al. (2016) collected 10 medicinally important plants, which have different ethnobotanical uses. *Aerva javanica* (Burm. f.) Juss. (Amaranthaceae) was useful to cure inflammations, abdominal worms and skin infections. Khan et al. (2014) reported that *C. procera* was useful to cure cough, rheumatism and skin infection. Qureshi et al. (2010) reported 63 herbs belonging to 50 genera and 29 families having medicinal importance. Matin et al. (2001) described 18 species of trees, 12 species of shrubs and 77 species of herbs being used for medicinal purpose to cure many diseases. All these studies are in accordance with the present ethnobotanical studies in Tehsil Gojra for 47 wild plant species

It has been confirmed that all the wild plants have much important role in folk medicines. Most of the local people rely on these plants based upon traditional knowledge. It has been approved in the past as well as during these surveys. These plants are also a source of raw materials for pharmaceutical industries.

Conclusions

It was concluded that Tehsil Gojra, Punjab, Pakistan has many wild plants that is good source of folk medicine. Most of the people rely on these plants to cure diseases based upon traditional knowledge. Thus, there is a need to raise awareness among people to use these plants based upon authentic documented information.

Declarations

List of abbreviations: Not applicable.

Ethical approval and consent to participate: This study was undertaken with approval of Local participants and community of Tehsil Gojra, district Toba Tek Singh, Punjab, Pakistan.

Consent for publication: Not applicable

Conflict of interests: The authors have declared that they have no conflict of interests.

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Authors' contributions: MT, KH and KN planned the study and surveys, KH and GY identified the plants with reference herbarium. SSA helped in write up of this paper.

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