



RESEARCH PAPER

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Ethno medicinal attributes and antioxidant screening of some selected plant species of Tanawal area, Pakistan

Fozia Bibi^{*1}, Habib Ahmad², Rizwana Aleem Qureshi³, Nighat Shaheen⁴,
Sadia Tabbasum⁵, Shujaul-Mulk⁶, Sumaira Sahreen⁷, Ghazala Shaheen⁸

¹Department of Botany Hazara University, Mansehra, KPK Pakistan

²Vice Chancellor Hazara University, Mansehra, KPK Pakistan

³Department of Plant Sciences Quaid-i-Azam University Islamabad, Pakistan

⁴Botany Department Government Post Graduate College Haripur, KPK Pakistan

⁵Zoology Department Hazara University Mansehra, KPK Pakistan

⁶Department of Plant Sciences Quaid-i-Azam University Islamabad, Pakistan

⁷Botanical Sciences Division Pakistan Museum of Natural History Garden Avenue Shakarparian, Islamabad, Pakistan

⁸Botany Department University of Balochistan, Quetta, Pakistan

Key words: Ethno medicinal attributes, Antioxidant screening, Tanawal, Pakistan.

<http://dx.doi.org/10.12692/ijb/9.1.237-254>

Article published on July 30, 2016

Abstract

Mountainous constituencies and surrounding areas of the Himalayas are gorgeous not only in medicinally noteworthy plant species but also in traditional understanding. The overall thrust of the present research was to investigate the ethno medicinal attributes and gather evidences concerning the various native uses, especially the medicinal curative plants and their importance in Tanawal valley and assess scavenging antioxidant activity by using 1, 1-diphenyl-2- picrylhydrazyl (DPPH). An overall of 48 taxa are reported as being used in the vicinity for numerous purposes by cross-examining 79 local, elderly persons from 12 rural communities on the subject of the traditional usages of wild food plants, medicinal foods, and home-made medical preparations. FL%, UV and FIC were calculated on the basis of highest FL, U.V and F.I.C eight plants were carefully chosen to detect antioxidant prospective in them using DPPH method. Our results recommend that leaves and flowers are the chief plant fragments used in most of the recipes and widely held recipes are prepared in the form of tea and infusion from newly collected plant parts. Frequently a single species are used and are mostly taken orally. Highest activity is shown by *Nasturtium officinale* (R.Br), *Achyranthus aspera* Linn, *Tegetes erecta* L, *Pistacia integririma* (J.L Stewart ex Brandis) and *Daphne oleoides* L. with 100 µg/ml. All the plants display a noteworthy magnitude, of antioxidant activity at their lower concentrations also (at 25 µg/ml). It is clearly publicized that all the selected plant species have a great influence to show the antioxidant abilities in them.

* Corresponding Author: Fozia Bibi ✉ brine4f@gmail.com

Introduction

Indigenous people residing in different belts depend on local herbs and other plant resources found in rural region and these are the principle source of medication for handling diseases since time centuries old. Despite widespread usage of wild plants as medicines in Pakistan, little is known about the antioxidant potential and chemical make-up of these plants (Abbasi, *et al.*, 2015). Plants have diverse combination of chemicals that can produce different results on different organisms. The plants equipped with better efficient compounds survived and evolved further while the species with less effective compounds lost in course of evolution Approximately 119 pure chemical substances extracted from higher plants are used in medications throughout the world to cure many diseases (Rogers, 2012). All-encompassing range of bioactive composites, such as phenolics, flavonols, carotenoids, and tannins certainly attributable to the wide-ranging antioxidant activity present in the selected medicinal plants (Beerling, 2007). The local populaces know the beneficial plants and preliminaries of raw drugs through own experience and ancestral curative treatments and long effectiveness. Furthermore, the high-priced allopathic prescriptions are out of range of a common man. These plants are a source of association between the persons and the natural resources of the region. (Singh and Hamalin 2013) declared it as a safe traditional therapy after discussing the role of herbal prescriptions for the handling of ailments and contagions. The investigation of the ethno medicinal attributes (U.V, F.L%, FIC) and importance of plant species, their occurrence in the area and evaluate scavenging antioxidant activity by using 1, 1-diphenyl-2-picrylhydrazyl (DPPH) has been the overall thrust and essence of present work. Ahmad *et al.*, in (2010) mentioned in the upkeep of vigor and safety from coronary diseases antioxidant ingredients of plant materials are important as they retain the capacity to defend the living body framework from impairment triggered by toxic free radical induced oxidative stress. Compared to edible plants, the chemical

composition and antioxidant activity of these selected ethno medicinally important plants have been poorly investigated and most of the available information only deals with traditional and medicinal aspects (Kamanja, 2014). All the structures of traditional medication have their origins in the house remedies and this knowledge is conveyed from one generation to other generation with the passage of time (Shinwari & Gillani, 2003). In fact, all the indigenous herbal or eastern system of medicine is entirely based on the properties of these plants. The significance of the herbal treatment can be well agreed by the maxim of Hippocrates "Let medicine be your food and food your medicine (Jay, 2011). Qureshi *et al.*, in (2007) carried out a research that confined native plants of Mianwali, (Pakistan) and their yields are really very essential for the people in order to meet their daily requirement of food, fodder, medicines etc. In the recent times, a galaxy of workers have made significant contributions in the field of Ethnobotany in Pakistan most prominent among them are (Abbasi *et al.*, 2010, 2015), (Ahmad *et al.*, 2009, 2010, 2014 and Ahmad *et al.*, 2010), Qureshi *et al.*, 2007, 2009) and (Shinwari 1996 and Shinwari & Qaiser, 2011). As Native individuals of the study zone (Tanawal) have constantly used therapeutic plants for a number of illnesses and hinge on the adjoining vegetal wealth from a considerable prolonged time. To our knowledge, there are no records regarding the traditional medicinal plant awareness and employment by the home-grown communities in Tanawal Area in understanding of the above, the current study was apprehended out to solicit the indigenous herbal species, their chunks used and their therapeutic uses to file such facts and figures.

Materials and methods

Study Area

The research area, i.e., Tanawal areas of Pakistan is located in the north of Pakistan with a latitude of 34.36 (34° 21' 30 N) and a longitude of 73.07 (73° 4' 0 E). The location is situated 564 kilometers north east (30°) of the approximate center of Pakistan and 74 kilometers north (353°) of the capital Islamabad and at an average elevation of 1374 meters above the sea.

The people are primarily agriculturists with growing agriculture crops. Tanawal comprises in the 3 districts of Khyber pakhtunkhawa i.e, Haripur, Abbottabad and Mansehra. It was well thought-out as very important area at the time of Amb state in 1800s (DiPietro *et al.*, 1999). Tanawal area was being devoid of major communal luxuries. Newly it has acquired a metal road and is interconnected with digital telephone. Electricity, schools and health services, which can fetch modifications in the old local culture, are scarce in the area. This is an attempt to provide an insight to the unreported hardship area of the region, which will hopefully provide a base for sustainable development of the floral resources of the area.

Ethnobotanical data

For documentation of the existing therapeutic flora, ethno botanical assessments were conducted in 2013-2014 indiscriminately nominated villages following the practice as designated by (Sharma and Khandewal 2010). The data were composed by consultations, interpretations and involvement. Consultations were taken in isolation and in groups. Plant specimens and materials, including propagules (corms, tubers, bulbils, culms, etc.) were gathered and identified by Dr. Rizwana Aleem Qureshi (Plant Taxonomist), Department of Plant Sciences, Quaid-i-Azam University by matching them with the Flora of Pakistan (Ali and Nasir, 1989–1991; Ali and Qaiser, 1993–2011) and preserved for herbarium specimens. During the field assessment, evidences on consumptions of plants to cure diverse ailments of individuals, quantities used, methods of planning and direction of medicine have been cool, calm and collected.

Selection of Informants

During appraisal we visited to the Tanawal Administration Authority that has the service to list the local herbalists/healers/ (locally termed as hakeems or pinsaries) to get the information from them as they are key informants. Ms. Foziabibi was well aware of the local language Hindku, which permits the accurate recordings of information so group discussions were held with the key informants, in which objectives of research were explained to them.

After meticulous confab with the local herbalists, we scrutinized the areas for comprehensive ethno medicinal survey the age of the interviewees ranges between 27 years to 78 years and both males and females have been interviewed. In appraisals, in addition tribal individuals and customary publics, their medicine men and women, local vaidu (physicians) and herbalists, forest spokespersons and different tribal communities' local pinsaries and hakims (local healers) etc. were interrogated.

Ethnobotanical attributes

Informants Consensus factor

The Informants' Consensus Factor was designed as the level of homogeneousness amongst information delivered by a number of informants. FIC that is also designated by Trotter and Logan in (1986) and (Logan, 1986) and Etkin, N. L. 1993 consuming the formulation:

$$FIC = \frac{Nur - Nt}{(Nur - 1)}$$
Where, Nur = mass of use reports of informers for a specific plant use group; Nt = number of taxa or species that are employed for that plant use category for altogether informants. FIC Values range between 0 and 1, where '1' specifies the highest level of informant consent.

The fidelity level (FL)

It is the proportion of informers engaging the practice of a definite plant species for the similar chief purpose, was considered for the most repeatedly testified ailments or conditions as:

$$FL (\%) = \frac{Np}{N} \times 100$$
Where, Np = is the informers that give a use of a plant species to cure a definite illness; N = number of informants that use the plants as a remedy to treat any given disease that also confirmed by Alexiades and Sheldon in (1996).

Use value

The use value (UV) is a manifestation of the relative significance of each plant species used by the informants in the study area range. The value was considered using the formula Phillips (1996) Sujarwo and Caneva (2015)

$$UV = \frac{\sum U}{n}$$
 where UV is the use value of the species, U is the number of usage reports cited by each informer for the known plant species and n is the total number of informants interrogated for that known plant species (Yabesh *et al.*, 2014).

Antioxidant Activities in Plants

Eight plants species having highest Fidelity level and Use values out of 48 plants from Tanawal area were selected to find out Anti-oxidant activities in them. The DPPH assay was done according to the method of Gyamfi *et al.*, (1999) with some modifications. The stock solution was prepared by dissolving 24 mg DPPH with 100 ml methanol and then stored at 20°C until needed. The working solution was obtained by diluting DPPH solution with methanol to obtain an absorbance of about 0.980 (± 0.02) at 517 nm using the spectrophotometer. A 3 ml aliquot of this solution was mixed with 100 μ l of the samples at varying concentrations (25, 50, 100 μ g/ml). The solution in the test tubes were shaken well and incubated in the dark for 15 min at room temperature. Then the absorbance was taken at 517 nm. The scavenging activity was estimated based on the percentage of DPPH radical scavenged as the following equation:

$$\text{Scavenging effect (\%)} = [(\text{control absorbance} - \text{sample absorbance}) / (\text{control absorbance})] \times 100.$$

EC₅₀ value is the effective concentration that could scavenge 50% of the DPPH radicals. Ascorbic acid standard were used as positive references. Each fraction was assayed in triplicate. Further there were 4 time variations i.e., 0.5 minute, 1 minute, 2 minutes, and 4 minutes at each concentration (25 μ g/ml, 50 μ g/ml and 100 μ g/ml) on which the

activity has been noted (Fig.6 to Fig.9). Plants were categorized as Excellent, Very good, Good and Significant according to the extent of activity shown by them (Table 4). Statistical evaluation has been employed to all the out comings of assay.

Results and discussion

As Human beings have direct impact on the plant diversity with which they interact. These interactions are the focus of ethno-botany (Sheng-Ji, 2001) hence, in direction to provide well option for the assortment of extensively used medicinal plants the present research is truly one of the preliminary come up to enumerate the ethno medicinal evidences and this attempt characterizes a first wide-ranging ethno botanical survey in Tanawal valley, of the province Khyber Pakhtunkhwa Pakistan. A total of 48 ethno botanically significant plant species are being testified from the study range going to a whole of 27 plant families. Pharmaceutical plants endure to be systematically castoff as a chief source of drugs for the handling of voluminous fitness complaints all over the biosphere. Keeping in view the ethno medicinal importance of *Nasturtium officinale*, *Zizyphusjuba*, *Achyranthus aspera*, *Oxalis corniculata*, *Daphne oleiodes*, *Tegeteserecta*, *Hibiscus rosa-sinensis* and *Pistaciaintegrrima* these plants having highest Use values and Fidelity level were thoroughly investigated for their antioxidant properties (Table 1 2).

Table 1. Most frequently used Ethnomedicinal plants for different ailment categories based on highest FL (%) in each ailment category (Total informants = 79).

Usage Category	Plant Name	Use	Fidelity level (%)
Gastrointestinal problems	<i>Allium cepa</i> L.	Diarrhoea	100%
	<i>Vernoniaanthelmentica</i> Willd.	Anthelmentic	100%
	<i>Trigonellafoenum – graceum</i> L.	To improve digestion	100%
	<i>Portulacaoleracea</i> L.	Anthelmentic	100%
	<i>Solanumsurattense</i> Burn.f.	Helminthiasis	100%
	<i>Oxalis corniculata</i> L.	Dysentery	100%
	<i>Calotropisprocera</i> (L.) R. Br.	Dysentery and as a purgative	96%
	<i>Zanthoxylumarmatum</i> DC. Prodr.	Stimulate digestion	100%
	<i>Amaranthusviridus</i> Linn.	Used as purgative	100%
Skin related	<i>Aloe barbadensis</i> Mill	Skin inflammations and burns	100%

Treatments	<i>Allium cepa</i> L.	Antiseptic, to treat boils and pimples	100%
	<i>Verbascumthapsus</i> Linn.	Wound healing	97.4%
	<i>Trigonellafoenum-graceum</i> Linn.	To treat boils, abscesses, small pox	100%
	<i>Zizyphusmauritiana</i> Lam.	Wounds	100%
	<i>Dodoneaviscosa</i> Linn. Jacq	Wounds swelling and burns	94.9%
	<i>Allium sativum</i> L.	to treat boils, abscesses	100%
	<i>Tegeteserecta</i> Linn.	To treat wounds	100%
	<i>Periplocaaphylla</i> Dcne.	To treat ulcers and wounds	97.4%
Urinary tract infections and kidney, bladder ailments	<i>Asparagus recemosus</i> Willd.	To remove kidney stones	93.67%
	<i>Thymus serpyllum</i> L.	Diuretic	100%
Snake, insect, dog bites	<i>Allium cepa</i> L.	Irritation caused by scorpion and hornet stings	100%
	<i>Solanumnigrum</i> L.	Rat bite	100%
	<i>Allium sativum</i> L.	insects bites	100%
	<i>Pistaciaintegririma</i> J. Stewart Brandis	exAntidote to snake venom and scorpion sting.	100%
	<i>Thymus serpyllum</i> L.	Toothache	100%
Dental ailments	<i>Calotropisprocera</i> (L.) R. Br.	curing toothache	96.2%
	<i>Olea ferruginea</i> Royle.	Tooth ache	91.1%
	<i>Zanthoxylumarmatum</i> DC. Prodr	Twigs are useful in gums problems.	100%
	<i>Zizyphusmauritiana</i> Lam.	Fever cold and flu.	100%
Flu/cold/fever	<i>Allium sativum</i> L.	very effective in influenza	100%
	<i>Meliaazderach</i>	To lower diabetes	98.7%
	<i>Zizyphusjujuba</i>	To normal diabetes	100%
	<i>Carallumaedulis</i> L.	To normal diabetes	91.1%
	<i>Ficus bengalensis</i> L.	Diabetes	89.87%
Malarial fever/Typhoid	<i>Ajugabracteosa</i> Wall Ex.Benth.	Malaria fever	94.9%
	<i>Ajugabracteosa</i> Wall Ex.Benth.	Ear ache	98.7%
Eye/Ear/Nose /Throat problems	<i>Verbascumthapsus</i> Linn.	Ear infections	89.8%
	<i>Allium sativum</i> L.	nasal instillation	100%
	<i>Olea ferruginea</i> Royle.	Throat sore	97.4%
	<i>Artemisia scoparia</i> Waldst	Sore throat.	96.2%
	<i>Vernoniaanthelementica</i> Willd.	Tonic	98.7%
General body tonic	<i>Solanummelongena</i> L.	Haematonic	98.7%
	<i>Amaranthusviridis</i> L.	General body debility.	100%
	<i>Oxalis corniculata</i> L.	Infected navels of babies	91.1%
Female and children related troubles	<i>Allium sativum</i> L.	vaginal infections	93.6%
	<i>Peganumhermala</i> Linn.	Smoke is inhaled after child birth to increase the healing	100%
	<i>Carthamusoxycantha</i> Bieb.	To regular periods	89.8%
	<i>Hibiscus rosa-sinensis</i> L.	Infertility in women	100%
	<i>Vernoniaanthelementica</i> Willd.	Cough	100%

Problems	<i>Verbascum Thapsus</i> Linn.	As a expectorant	89.8%
	<i>Trifoliumrepens</i> L.	Spasmodic cough	93.6%
	<i>Allium sativum</i> L.	eliminate cough	100%
	<i>Pistaciaintegrrima</i> J.L Brandis	StewartCough and asthma	89.8%
Cancer and tumours	<i>Nasturtium officinale</i> R. Br.	Cancer suppressing properties	88.60%
	<i>Periplocaaphylla</i>	to treat tumors	86.0%
Anti-lice/Dandruff/ Hair problems	<i>Ajugabracteosa</i> Wall Ex.Benth.	Used as anti-lice	89.8%
	<i>Thymus serpyllum</i> L.	Alopecia	88.6%
	<i>Cuscutareflexa</i>	Anti-lice	100%
Poisonous/ Fish poison	<i>Portulacaoleracea</i> L.	Poisonous to horses	89.8%
	<i>Verbascum Thapsus</i> L.	Fish poison	78.48%
	<i>Calotropisprocera</i> (L.) R. Br.	Poisonous plant	98.7%
Masculo skeletal problems	<i>Solanum nigrum</i> L.	Osteopathy. Gouty joints and rheumatic pains	100%
	<i>Oxalis corniculata</i> L.	Fractured bones	98%
	<i>Artemisia scoparia</i> Waldst.and kit	Bandages for painful rheumatic joints	87.3%

Table 2. Plants documented from Tanawal Area and their reported Ethno botanical usages with U.V Values.

Name of Plant	Family	Local Name	Part used	Recorded uses, preparation and mode of administration by Tanawal people	NI	U.V Value
1 <i>Ajugabracteosa</i> Wall ex, Benth.	Lamiaceae	Kaurree bootee	Whole plant	The leaf juice is tipped in ear to cure earache. The leaves are used locally to cure headache. It is also used to kill lice.	11	2.6
2 <i>Calotropisprocera</i> (Ait.) R.Br.	Asclepedia-ceae	Ak	Milky latex, stem and leaves	Fresh leaves are used as bandages in rheumatic pains. The plant is considered as poisonous.	9	2.1
3 <i>Vernoniaanthelmentica</i> Willd.	Asteraceae	Kaleezeree	Seeds	Crushed seeds with honey are given for the treatment of round worms. An infusion of the powdered seeds is used as tonic, diuretic, and stomachic, it is also taken as expectorant. 5 seeds are taken daily with water for cough.	6	3.1
4 <i>Trigonellafoenum-graceum</i> L.	Papilionaceae	Maithee, Maithray	whole plant	People make 'Halwa' (sweet dish) of these seeds in 'Desighee' to improve digestion, and deliberate it as carminative. A poultice of leaves is applied on swellings and burns.	7	3
5 <i>Allium cepa</i> L.	Liliaceae	Piyaz	Bulbs, Leaves	It is said that eating onion regularly is a good general disease – preventive measure. Its juice is applied to soothe the irritation caused by scorpion, and	11	2.8

Name of Plant	Family	Local Name	Part used	Recorded uses, preparation and mode of administration by Tanawal people	NI	U.V Value
				hornet stings. The scales of onions are used as antiseptic on boils and pimples. In diarrhea, people use its boiled water.		
6 <i>Allium sativum</i> Linn.	Liliaceae	Thoom	Bulbs	People use garlic to treat or prevent an amazing array of ailments including cold; flu, heart diseases, high blood pressure, high cholesterol, cancer, worms, earache, and vaginal infections. Local people squeezed garlic on insect bites, or sting.	11	3.0
7 <i>Asparagus recemosus</i> Willd.	Liliaceae	Shahghandal	Tuberous roots & bark of the stem are generally used	The juice of the root given with the milk is extremely effective for kidney stones.	9	2.66
8 <i>Carthamusoxycantha</i> Bieb.,	Asteraceae	Pohlee	flowers	Used as anthelmintic for children. Also used for women periods discordsand menorrhagia.	9	1.8
9 <i>Hibiscus rosa-sinensis</i> L.	Malvaceae	Gurrhal	Flowers	Infertility in women, irregular menstruation. Juice from macerated flowers is administered orally. The healers also used to treat diabetes.	20	3.45
10 <i>Cichoriumintybus</i> L.	Asteraceae	Kasnee	Vegetative portion and flowers	The roots are dried under shade and then ground to obtain powder. About a pinch of this powder is taken with half glass of water twice a day before meal to lower blood glucose level.	6	2.8
11 <i>Foeniculumvulgare</i> Mill.	Apiaceae	Saunf	Leaves and fruits	A decoction is made with black tea in the treatment against flatulence, indigestion, colic pains and in stomach ache.	10	4
12 <i>Carallumaedulis</i> Edgew	Asclepiadaceae	Choonga	Vegetative parts	The aerial parts are cooked as vegetables by local people for diabetes mellitus.	10	1.7
13 <i>Meliaazaderach</i> L.	Meliaceae	Dharek	Fruits Leaves	The dried fruits of the plant are ground to make powder. About a teaspoon is given with glass of water before as first thing in the morning. It is considered by the healers that it is	14	2.33

Name of Plant	Family	Local Name	Part used	Recorded uses, preparation and mode of administration by Tanawal people	NI	U.V Value
				an effective treatment of diabetes patients.		
14 <i>Portulacaoleracea</i> L.	Portulacaceae	Kulfaa	Whole plants	The entire plant is used in dysentery and Poultices of fresh leaves are used to treat boils.	16	3.0
15 <i>Oxalis corniculata</i> L.	Oxalidaceae	Khattkurla	Whole plant	The plant is used in the treatment of convulsions in children, and for healing fractured bones. The ground leaves are used to help purify the blood and for digestion.	10	4.6
16 <i>Solanumnigrum</i> L.	Solanaceae	Mako, Kachmach	Whole plant	The leaves are used as poultice for rheumatic and gouty joints, and skin diseases. A decoction of the berries and flowers is useful in cough; The root is useful in osteopathy and hepatitis.	14	2.7
17 <i>Solanummelongena</i> L.	Solanaceae	Baigan	Roots, Leaves and unripe fruits.	The roots are analgesic, laxative, and cardio tonic, and are useful in inflammations cardiac debility, and ulcers in the nose.	13	3.1
18 <i>Thymus serpyllum</i> L.	Lamiaceae	Satarfarsi, banajwain	Whole plant	Local healers used an infusion of leaves in the treatment of itch and skin eruptions. Infusion of leaves with 'Gurr' acts as diuretic.	11	1.2
19 <i>Atropaacuminata</i> Royle. exMiers	Solanaceae	Bantambaku	Leaves	Leaves are considered as sedative and diuretic in small amount.	12	1.8
20 <i>Peganumhermala</i> Linn.	Rutaceae	harmal	Seeds and leaves	Seeds are antiseptic and are used in small pox Leaves are used as insect repellent.	13	4
21 <i>Amaranthusviridus</i> L.	Amaranthaceae	Chulaai	Leaves and roots	Local healers considered this as stimulant tonic for general debility.	14	2.1
22 <i>Artemisia scoparia</i> Waldst.	Solanaceae	Tarkha	Roots	Powdered form of roots is useful in epilepsy. Tea made by it is used in sore throat.	11	1.5
23 <i>Solanumsurattense</i> Burnf.	Solanaceae	Kindiaree	Whole plant	It is considered to be useful in vitiated conditions of helminthiasis, dental carries, inflammation, flatulence and	9	3

Name of Plant	Family	Local Name	Part used	Recorded uses, preparation and mode of administration by Tanawal people	NI	U.V Value
				colic.		
24 <i>Trifolium repens</i> L.	Papilionaceae	Shotla	Vegetative parts	Expectorant, analgesic, antiseptic properties and also to treat rheumatic aches.	10	3.1
25 <i>Verbascum thapsus</i> Linn.	Scrophulariaceae	Gidarrtam bakoo	Leaves and flowers	Leaves in powdered form are used for healing the wounds and for inflamed portion. The leaves and the flowers are used as an infusion to reduce mucus formation, and stimulate the coughing up of phlegm.	15	3.75
26 <i>Dodonaea viscosa</i> Linn. (Jacq)	Sapindaceae	Sanatha	Leaves	Leaves are crushed and used as a poultice in the treatment of wounds, swelling, and burns. Also used as febrifuge in rheumatism.	17	1.6
27 <i>Pistacia integrifolia</i> J. Stewart ex Brandis	Anacardiaceae	Kakkarra Singi	Galls	Galls are powdered and fried with ghee given internally in dysentery. It is also an antidote to snake venom and scorpion sting. Local healers considered it as effective in cough and asthma	13	4.3
28 <i>Aloe barbadensis</i> Mill.	Liliaceae	Ghikur,	Fresh leaves and leaf juice.	The juice is used in dyspepsia, burns, colic, skin diseases, and in constipation.	14	4.8
29 <i>Tegetes erecta</i> L.	Asteraceae	Gainda	Flowers, Leaves	Leaves are applied on boils and carbuncle; juice is given in earache. Flowers are used in eye diseases, ulcers, internally it is said to purify blood; juice is used for bleeding piles.	10	5.1
30 <i>Celtis australis</i> Linn.	Ulmaceae	Batkaral	Young leaves and fruits	The fruit is used in colic and amenorrhea. Young leaves are applied to wounds as first aid or earlier treatment.	11	1.5
31 <i>Daphne oleoides</i> Schreb.	Thymeliaceae	Kuteelaal	Roots and flowers	An infusion of the leaves is used in the treatment of cutaneous infections.	9	4.3
32 <i>Cuscuta reflexa</i> Roxb.	Cuscutaceae	Marzbotte, Akas bail	Whole plant.	The plant is boiled with water along with the bark of <i>Acacia Arabica</i> , and used for toothache and septic gums. The infusion is also used as anti-lice.	11	2.7

	Name of Plant	Family	Local Name	Part used	Recorded uses, preparation and mode of administration by Tanawal people	NI	U.V Value
33	<i>Zizyphus mauritiana</i> Lam.	Rhamnaceae	Ber	Whole plant	The bark is useful in dysentery, diarrhea and seeds are useful in treating cough, asthma, wounds, diarrhea, vomiting, and for insomnia.	19	2.2
34	<i>Nasturtium officinale</i> R.Br.	Brassicaceae	Piryahalim	Whole herb	The herb is used as a tonic tea to energize heart and blood circulation. Cancer suppressing properties.	17	3.5
35	<i>Trianthema portulacastrum</i> Juss. Ex Medic	Aizoaceae	woho	Whole plant	Decoction of roots is taken internally to treat Constipation and Asthma.	8	1.8
36	<i>Periploca aphylla</i> Dene.	Asclepiadaceae	Barairree	Whole plant	The infusion of vegetative parts of the plant is used to treat wounds and ulcers. While decoction is used to treat tumors.	10	1.8
37	<i>Zanthoxylum armatum</i> D.C	Rutaceae	Timar	Fruits, seeds and branches	Dried fruits are used as carminative and in toothache. Seeds are used in fever and in cholera. Young branches are given as "maswak" (tooth brush) by the local healers. Seeds are given to cows to increase milk secretion.	14	4.7
38	<i>Zizyphus jujuba</i> Mill.	Rhamnaceae	Beri	Fruits Leaves	4-5 fresh leaves are chewed daily to lower blood glucose level.	11	4.3
39	<i>Ficus bengalensis</i> L.	Moraceae	burr	Latex and Leaves	The latex obtained from the aerial parts of the plant (leaves and young branches) and mixed with honey and used orally to control high blood glucose level.	15	1.8
40	<i>Echinopsechinatus</i> Roxb.	Asteraceae	Kanda bootee	Whole herb	The plant is recommended in Jaundice. The powdered root is used as antilice and also applied to wounds of cattle for killing maggots	18	1.8
41	<i>Opuntia dillenii</i> Miller.	Cactaceae	Moni raj Nag phani	leaves	To maintain health and mental strength. Juice obtained from macerated leaves is orally taken	14	2.1
42	<i>Berginia ciliata</i> (Haworth) Sternb.	Saxifragaceae	Batpeh	Roots	Root decoction is taken empty stomach in the morning for 3 months to cure kidney stones.	16	2.2
43	<i>Achyranthes aspera</i> Linn.	Amaranthaceae	Phutkanda, Landa	Roots and seeds	The whole plant, and especially the roots, characterized by their anti-inflammatory, and uterine stimulant activity. A decoction of the roots is used for stomach troubles,	11	3.1

Name of Plant	Family	Local Name	Part used	Recorded uses, preparation and mode of administration by Tanawal people	NI	U.V Value
44 <i>Menthaspicata</i> L.	Lamiaceae	Chittapodi na	Leaves and seeds	Seeds and leaves are used in bowel complaints	13	3.8
45 <i>Menthalongifolia</i> (L) huds.	Lamiaceae	Junglepodina	Leaves	Used in dyspepsia, Decoction of the leaves is used as mouth wash.	14	3.7
46 <i>Delbergiasisso</i> Roxb.	Cesalpiniaceae	Shesham, Talee	Leaves	The crushed leaves mixed with rose water and lemon juice is used to treat freckles and for skin complexion.	10	1.5
47 <i>Calendula officinalis</i> L.	Asteraceae	sadbarga	Leaves and flowers	Used in wound and eczema	9	1.5
48 <i>Olea ferruginea</i> Royle.	Oleaceae	Kahoo	Leaves and flowers	Toothache and gargles of the warm leaf infusion is employed in sore throat	11	4.1

NI= Number of Informants, UV= Use Value.

FIC values were being determined in order to detect the settlement among the spokespersons of Tanawal area about the use of plants that indulge in curing definite condition categories (Fig. 4, 5). It is witnessed clearly that the FIC figures wide-ranging starting with 0.41 up to 0.86 having a regular value of 0.68. Carminative has the uppermost figure value 0.86 with 37 use-reports for 6 plant species, chased by Musculoskeletal ailments (FIC = 0.85; 29 use-reports), Skin related treatments (FIC = 0.83; 62 use-reports), Female related troubles (FIC= 0.8, 51 use reports). Those remedial plants have high FIC values that thought to be effective in handling certain ailment. The high FIC figure for Carminative feasibly (Table.3, fig.5) indicated firstly that this ailment is communal in the studied range due to deprived public health and secondly considering about this ailment category there is a well defrayal communication reputable among informers. Similar detections of ethno botanical data in other different areas have been calculated by different ethno botanists/ researchers/ scholars (Hoffman and Gallaher. 2007, Srithi *et al.* 2009, Ugulu *et al.*, 2009). It has been observed in the current study that high FIC values also pointed out the species conventionally used to care these complaints is valued penetrating because of biologically active amalgams.

Plants used for allergy and snake, insects and dog bites having the least agreement (FIC=0.41) between the informants. On the other hand, the low FIC value as recognized in our study may possibly be because of deficiency of communication between people in different areas. Another parameter of ethno botanical attributes is to determine customarily significant medicinal species in the zone of study is Fidelity Level (FL %) that has planned constructed on usage reports which have been quoted by 12 or more informers for being used against a specified complaint (Table 1). The highest fidelity levels (100%) were observed for the plants used within single categories with many use reports. The largest number of plants with fidelity level value 100% was observed for the species used for gastrointestinal disorders (Fig 4). This was followed by plants used for skin related treatments (Fig 4). The examination revealed that the maximum FL value observed in *Pistacia integririma*, *Zizyphus jujuba*, *Tegetes erecta*, *Trigonella foenum – graceum*, *Allium cepa*, *Allium sativum* and *Hibiscus rosa-sinensis* followed by *Nusturtium officinale*, *Oxalis corniculata*. The slightest FL values were seen in the cases of *Verbascum thapsus* as a Fish poison and *Thymus serpyllum* as a Toothache (Table 1). A parallel investigation in some other part of globe has been carried out by Rokaya *et al.*, 2010).

Plants were deliberated for antioxidant activity with DPPH and it has been exposed during the study that excellent activity of 50µg/ml at 0.5 minutes shown by *Nasturtium officinale* and *Tegeteserecta* (Fig 6). XU *et al.*, 2012 noticed the advances in phytochemical studies and biological activities in *Tagetes* L. from 1925 to 2011. Significant activity has been observed in *Zizyphusjujuba*, *Oxalis corniculata* and *Pistaciaintegerrima* at the same. The results from the antioxidant assays show that all extracts can act as radical scavengers to a certain extent. Whereas it is also evident (Fig 8.) extracts of 100µg/ml all the selected eight ethno medicinally important plant species at 0.5 and 1 minute of time variations showed best activity, i.e., more than 65%. However, *Daphne oleoides*, *Hibiscus rosa-sinensis* and *Achyranthosaspera* showed 47.8%, 46.6% and 49% respectively at 50µg/ml (Fig.7). As four categories viz. Excellent (80%-65%), Very Good (64%-49%), Good (48%-34%) and significant (33%-20%) have been made depending upon the extent of antioxidant activity delivered by the plants at 30 seconds or 0.5 minutes (Table 1). Plants showed a great effectiveness at first two time variations (i.e., 0.5 minute, 1 minute) at the concentration 100 µg/ml. A pattern of activity is shown in descending order as we moved from 0.5 to 4 minutes i.e., $0.5 \geq 1 \geq 2 \geq 4$. Different parts of medicinal plants are employed as simple drugs (Fig. 2) and some plants are used with some other plant parts. While interviewing it was noticing that the number of man perpetrators was higher 67% as paralleled to the female respondents 33% (Fig 1). The present work is one of the initial afford to quantify the ethno medicinal information in Tanawal area of Pakistan which provides better option for the selection of widely used medicinal plants for searching bioactive compounds to treat ailments.

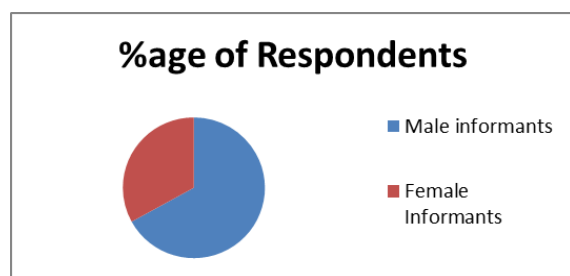


Fig. 1. Percentage of respondents on the basis of gender.

These are the plants that have been used in variety of ailments such as *T. erecta* is very popular to cure skin cuts and wounds while *P. integerrima* has been employed in dysentery, cough and asthma and as an antidote for snake bite. While young twigs of *O. corniculata* has been considered to cure the infectious navels of babies and convulsions in children. It is also applied in the form of paste on fractured bones in order to strengthen the bones. *Hibiscus rosasinensis* is given in diabetes and also considered a best plant for female related disorders (infertility in women and for irregularity in menstruation cycle). Most of the customary therapists were unwilling to disclose any evidence but a few agreed for collection sharing of knowledge from the Tanawal area. In terms of Use Value (Table 2) the most commonly plants species of Tanawal valley were *Tegeteserecta* (5.1), *Pistaciaintegerrima* and *Zizyphusjujuba* (4.3) as fresh leaves of *Zizyphus* has been considered to lower the glucose level hence is given to treat diabetes while, and flowers and very young leaves of *Olea ferruginea* (Use value 4.1) has been considered for sore throat. The Use Value has also been considered using the same criteria and formula by (Bibi *et al.*, 2014). While Gul *et al.*, in (2012) discoursed the existing standing of ethno-botany in Pakistan. They highlighted on the necessity of exploration, documentation and application of traditional knowledge in the use of natural resources. It is very interesting to notice that a global trend of interest has been increased in the traditional system of medicines in the recent years. (Gupta & Chadha, 1995) documented that herbs become a potential source of therapeutic value only because of biodynamic composites detected in them. The plant-based medicines do not have any ruthless effects but have facilities due to the arrangements of pharmaceutical ingredients united with vitamins and minerals. World Health Organization (2000) has enumerated 20,000 remedial plants universally and roughly estimated 80% of the population in the emergent countries is contingent directly on plants or green flora for its medications. Gao in (2011) explored only those plants comprising many different antioxidant constituents such as polyphenolic compounds,

vitamins that can deliver protection hence they are good sources of natural antioxidants. *Zizyphusjuzuba* showed more than 65% activity at (0.5minutes 100 µg/mlin the current research. Zhang in (2010) declared Jujube fruits possessed several compounds, including vitamins, flavonoids as well as different phenolic compounds. *Hibiscus rosasinensis* Linn (known as Gudhal in Urdu, and Shoe Flower in English) is mentioned by Kumar in (2012) in ancient medical literature to possess anti-tumor, detoxifier, antifertility, and wound healing activities. Our results show that this plant has more than 75% antioxidant potential in it. A variety of sterols, carbohydrates, glycosides may be accountable for hypoglycemic and antioxidant effects of this herb (Mak *et al.*, 2013). Shinwari Z.K while doing effort on ethno botanical conservation aspects in (2010) explained the human influence on mountain surroundings has intensified considerably over the last numerous hundred years and in particular in the current era. These interpolations have both improving and alarming special effects on the mountain environments. For Pakistan it is predictable that about 400-600 curative plant species out of a total of 5700 are surviving throughout the country. It is assessed that up to early 1998, 84% of Pakistani populace was reliant on customary medications while an estimated 80% of the rural population of Pakistan still depends on traditional medicines for their primary healthcare needs (Jan *et al.*, 2012). *Achyranthes Aspera* L. It is an upright, annual herb, distributed in the hilly areas of Tanawal region. The plant has capable of showing antibacterial antiviral anticancer anti-oxidant and is also considered in homegrown system of medicine (Anand. 2014). Our questionnaire (appendix 1) allowed descriptive responses on the plant prescribed, such as part of the plant used (Fig. 2), medicinal uses, detailed information about mode of preparation i.e., decoction, paste, powder and juice (Fig.3,5) and form of usage either fresh or dried and mixtures of other plants used as ingredients. The selected respondents were social workers, farmers, rural herbalists (*Hakeem's*) and housewives who are highly knowledgeable about medicinal plants and specialists such as healers,

bonesetters and midwives these are experts in field of medicinal plants and were having great reputation in the Tanawal society about their knowledge on traditional medicines. According to them leaves and flowers are the chief plant fragments used in most of the recipes (fig.2) and widely held recipes are prepared in the form of tea and infusion (fig.3) from newly collected plant parts.

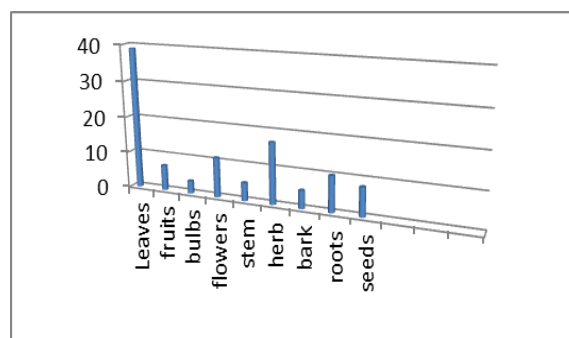


Fig. 2. Uses of plant parts mentioned by interviews.

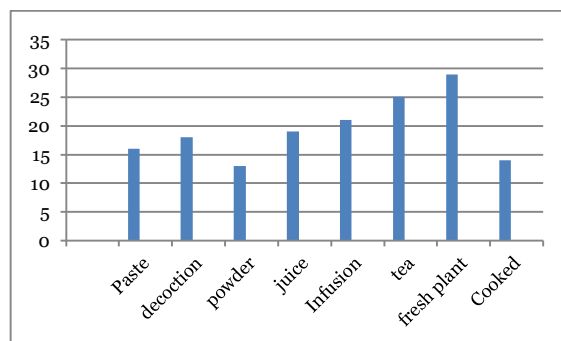


Fig. 3. Various forms of recipes reported from Informants.

Frequently a single species are used and are mostly taken orally. Balick in (2008) revealed that investigators are concentrating primarily on ethno botanical and ethno medicinal exploration to justify the increasing mandate of herbal products. Marwah *et al.*, investigated in (2007) found antioxidant activities of the some edible and wound-healing herbs in Oman. The DPPH assay methods were used which also confirmed the present work. Oxalic acid is present in the foliage of *Oxaliscorniculata* (locally termed as Khatkurlaa) a wild plant of Oxalidaceae has shown different effects as anti-scorbutic in the treatment of scurvy, antimicrobial, antifungal,

wound healing and cardio-relaxant and nematocidal activities (Singh and Prakash, 2013). It showed 63.7% antioxidant capability in it and can be serve a good

natural antioxidant. The medicinal property in Daphne has been performed by (Süntar, 2012) that also favors the outcome from these present findings.

Table 3. Categories of ailments and informant consensus factor (FIC) for each category.

Use categories	Number of taxa (Nt)	Number of use report (Nur)	Consensus factor
1 Skin related treatments	11	62	0.83
2 Sedatives	9	29	0.71
3 Upper respiratory tract problems	8	25	0.70
4 Dysentery	14	49	0.72
5 Urinary tract infections and kidney & bladder ailments	12	30	0.62
6 Diseases related to eye, ear, nose and throat	22	71	0.70
7 General body tonic	9	28	0.70
8 Diuretic	13	31	0.6
9 Snake, Insect and Dog bites	12	22	0.47
10 Musculo-Skeletal problems	5	29	0.85
11 Cancer tumors	6	20	0.73
12 Females related troubles	11	51	0.8
13 Dental Disorders	17	46	0.64
14 Allergy	19	32	0.41
15 Diarrhea	15	41	0.65
16 Anthelmintic	17	43	0.61
17 Carminative	6	37	0.86
18 Cold & Fever	21	51	0.6
19 Jaundice	6	20	0.81
20 Poisonous	8	21	0.65
21 Malarial Fever/ Typhoid	5	19	0.77
22 Hair treatment	9	30	0.72

Table 4. Plants showing different extent of antioxidant activity.

Plant Species	100 µgm/ml	50 µgm/ml	25 µgm/ml
<i>Nasturtium officinale</i>	++++	++++	++
<i>Zizyphusjuzuba</i>	++++	+++	++
<i>Achyranthusaspera</i>	+++	++	+
<i>Oxalis corniculata</i>	+++	+++	++
<i>Daphne oleoides</i>	+++	++	++
<i>Tegeteserecta</i>	+++	++++	+++
<i>Hibiscus rosa-sinensis</i>	++++	++	++
<i>Pistaciaintegrrima</i>	+++	++++	++

(++++ = Excellent, +++ = V.Good, ++ = Good, + = Significant).

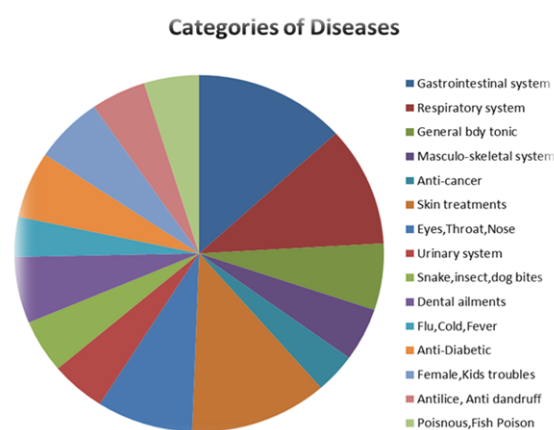


Fig. 4. Categories of Diseases mentioned in FIC.

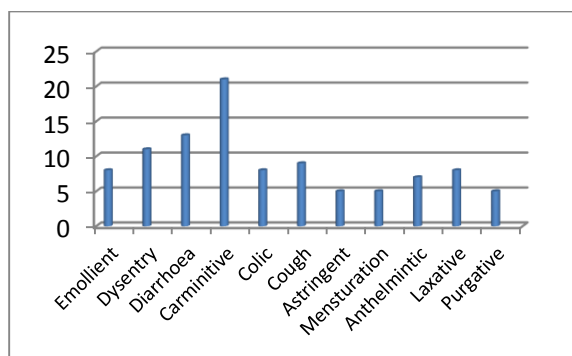


Fig. 5. Categories of uses of Medicinal Plants.

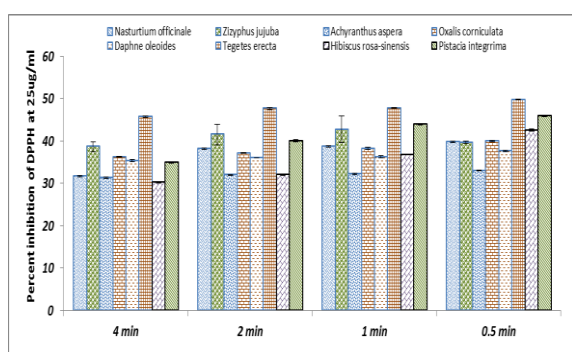


Fig. 6. Graph showing percentage inhibition of DPPH at 25 µg/ml of extracts at four time periods.

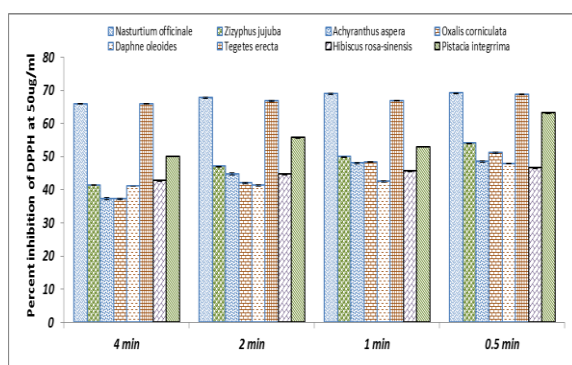


Fig. 7. Graph showing percentage inhibition of DPPH at 50 µg/ml at different time periods.

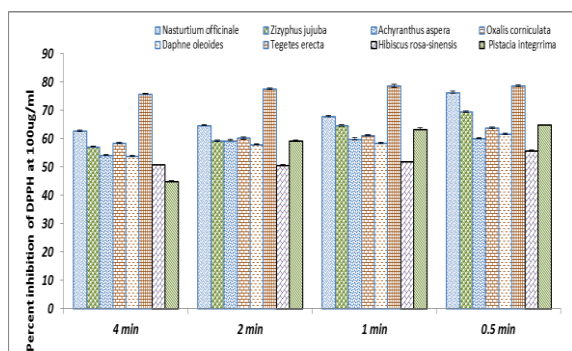


Fig. 8. Graph showing percentage inhibition of DPPH at 100 µg/ml at different time periods.

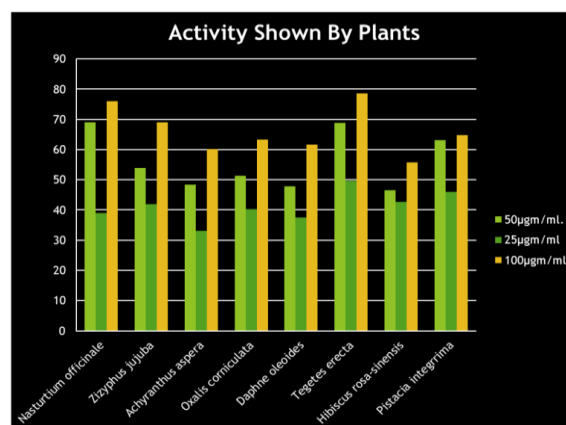


Fig. 9. Antioxidant activities of selected plants at all three concentrations taken at 30 seconds.

Conclusion

The appraisal showed that, the area under consideration has adequate healing plants to cure simple and intricate human ailments. Many local traditional persons are still dependent on medicinal plants, because well-knowledge therapists have respectable communications with patients and this would expand the worth of healthcare conveyance. Further research is defensible on the plant species that are therapeutically utilized and attention is necessary on those which are having high fidelity or reliability level, high use value they can provide the researches with an assessable implement to scrutinize the affiliation between taxonomic groups based on their ethno pharmacological usages.

Appendix

1. Informant's name.
2. Age and gender of the Informant.
3. Educational qualification of the Informant.
4. Name of the Informant's village or address place.
5. How long do you live in the residential home?
6. Name the used indigenous plant.
7. How frequently this plant is present in the area.
8. Mention the disease cured by the plant.
9. Mention the part of the plant would you use.
10. How can you make the plant for use?
11. Do you know how and when will you use the plant?
12. Name the recipe do you use approximately.
13. Mention the duration of the restoration period using the recipe.
14. Is there any complication occurred from the plants used by you?

Acknowledgement

The writers are indebted to all the informants of the research area for sharing their knowledge. Association of Forest Departments of all the three Districts of study area in order to gather the present work in a proper track is correctly acknowledged.

Author's contributions

FB conceived of the study, carried out the ethno botanical field trips, antioxidant studies, calculated the ethno botanical attributes and drafted the manuscript and HA supervised the whole work. RAQ carried out identification of the plants. ST and MR participated in the statistical analysis. MAK helped in writing manuscript. All authors read and approved the final manuscript.

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