

## ETHNOPHARMACOLOGICAL RELEVANCE OF TRADITIONAL MEDICINAL FLORA FROM SEMI-TRIBAL AREAS IN KHYBER PAKHTUNKHWA, PUNJAB, PAKISTAN

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### Abstract

Medicinal plants are locally used for the cure of many diseases. The present study aimed to document the medicinal knowledge as well as medicinal flora of indigenous plants of native communities and represents the first ever ethnomedicinal study from Darra Tang, LakkiMarwat and Kundal, Mianwali. The ethnomedicinal information was conducted via crucial informant conversation, group meetings with herbalists, semi-structure interviews and local people having awareness about the remedial exploit of plants. Current research work describes a brief overview of ethnomedicinal scheme in the study area, by highlighting the vital indigenous constituent of medicinal plants. The rest of the study is dedicated to an investigation and documentation based on the 94 reordered medicinal species belonging to 40 families. The leading family Poaceae was signified by the highest number of medicinal plant species (11). Indigenous people most frequently used leaves of the plants. The greatest amount of species was used to treat gastrointestinal, inflammational, renal, urological and dermatological ailments whereas for diabetes the ratio was the lowest. Dominated medicinal plants with most use values were *Rhazya stricta* having (UVi=0.98) and *Phoenix dactylifera* (UVi=0.96). There was a significant correlation between the age of informant and used plant known ( $y = 0.1307x + 26.756$ ,  $r = 0.012$ ) and known plants ( $y = 0.4043x + 16.995$ ,  $r = 0.082$ ) number by informant. The present study exposes that this vast treasure of medicinal plant played a key role in the health maintenance of local communities from Darra Tang, LakkiMarwat and Kundal, Mianwali.

**Keywords:** Medicinal plants, Indigenous people, Used value, Darra Tang and Kundal, Ethno-medicines.

### Introduction

Ethno-medicinal knowledge initiated in the early 1800s when John W. Harsberger, a renowned botanist, suggested ethnomedicinal study for the first time (Cotton, 1996). Medicinal plants has played a key role in people's live historically and has much credible to contribute in defensible progress for economy and society in the future (Rana, 2011). Enhancing the demand in developing and developed countries, about 85% world residents depends on herbal remedies for preclusion and cure of ailments (Abramov, 1996), while about 25% of drug elements were obtained from higher plants (Principe, 2005). Additionally, the exploration of herbal medicines to treat malaria, cancer, AIDS, as well as chronic grievances such as asthma, arthritis and rheumatism has been already testified. The population in many developing states depends on plant based drugs, even currently, moreover, the modern scientific system of health care is chiefly reliant on plant based constituents (Srithi *et al.*, 2009; Mushtaq *et al.*, 2012). In almost every nation of the world, treatment through herbs and some traditional remedy method is rolling. Traditional systems in Subcontinent (Indo-Pak) are known as Unani or Ayurvedic system (Marwat *et al.*, 2011). Ethno- medicinal knowledge is required to document the plant life in particular which are present in remote and un-explored areas.

Pakistan has a rich floral diversity, represented by approximately 1572 genera and around 6000 wild plant species, which are mostly common in the Khyber Pakhtunkhwa and Punjab regions (Tardío & Pardo-de-

santayana, 2008; Abbasi *et al.*, 2010). Indigenous curative awareness is a part of the Pakistani tradition, and remedies based on plants-based are culturally used by the mainstream of the Pakistani population (Qureshi *et al.*, 2009; Bahadur *et al.*, 2013). A number of demonstrative reports have enumerated approximately 600 medicinal plant species in the cure of common diseases in the local communities of Pakistan (Wondimu *et al.*, 2007). Pastoral patients are more reliant on traditional medicine for the cure of several ailments because of the worth, ease of use, minimal side effects and reasonable charge. This type of folk medicinal information is adapted in homes frequently, and it is reassigned from generation to generation (Khan *et al.*, 2013). Northern Pakistan is rich in of therapeutic plants distribution and traditional treatment amongst the local ethnic societies. Several ethno-medicinal investigations have been showed in north-western region of Pakistan and many have compiled evidence on the use of healing plant species in other region of the country (Shah *et al.*, 2013; Ullah *et al.*, 2014).

The semi-tribal area is located where the two provinces Khyber Pakhtunkhwa and Punjab are interconnected. This makes LakkiMarwatKundal, and Darra Tang, a floral rich region, where the local people use medicinal plants for different necessities. The old traditional practice of semi-tribal area Kundal, Darra Tang, and LakkiMarwat, Khyber Pakhtunkhwa; Mainwali, Punjab are bound mainly by low income class, reliant on agriculture. The absence of communication with modern progression has kept them nearer to nature where they derive many of their day-to-day needs. The

natives, in precise elders and traditional therapists, have centuries-old information about the practice of plants for treating series of common ailments (Ghani *et al.*, 2012).

Keeping in view the significance of medicinal flora, the present study goals to explore and analyze traditional knowledge of medicinal plant species utilized for encouragement and prevention of numerous health issues. Furthermore, our aim is to discover and document the herbal preparation, part used, diseased cured, recipes including methods and modes of application and administration of medicinal plant species in Darra Tang and Kundal. It will also enhance opportunities for local applicant to choose medicinal species that are highly significant for pharmacological and phytochemical evaluates for future succeeding works. Though, an in-depth study is required to report the traditional knowledge and their socioeconomic influences in this region.

## Materials and methods

### Geo-ethnographical description of the research area:

The study was conducted in Kundal and DarraTang which are situated between the borders of two provinces, partly in Tehsil Isakhel District Mianwali, Punjab and partly in Tehsil LakkiMarwat, District LakkiMarwat, KhyberPakhtunkhwa. It is located between 32° 36' and 33° 14' N and 71° 7' and 71° 44' E as shown in Fig. 1 (Map of Kundal and DarraTang ) and it is located at an altitude of 650 to 725 feet above sea level with an area of 150 and 100 acre Kundal and Darra Tang respectively. Total population of the two study areas is 24,345 people ([https://en.wikipedia.org/wiki/Darra\\_Tang](https://en.wikipedia.org/wiki/Darra_Tang)).

**Socio-demographic background:** The Kundal is town of Isa Khel which means circle and this name is due to specification of its presence between two rivers and two mountains. In November 1901, Khyber Pakhtunkhwa was carved out of Punjab and towns of Isa Khel were separated from Bannu District and hence a new tehsil Isa Khel with District Mianwali city was made and placed in Punjab ([https://en.wikipedia.org/wiki/Mianwali\\_District](https://en.wikipedia.org/wiki/Mianwali_District)). Whereas Darra Tang is a town of LakkiMarwat District in Khyber Pakhtunkhwa province of Pakistan. A special type of wind blows in winter from Darra Tang, which is called “Tang” by local people ([https://en.wikipedia.org/wiki/Lakki\\_Marwat\\_District](https://en.wikipedia.org/wiki/Lakki_Marwat_District)). Intensity of wind is so high in winter that electricity can be generated from it.

Indigenous people of the area are Niazis and Pakhtuns however a small ratio of other tribes are also established here. Local communities use resources of plant as a medicine and also get monetary advantages and it is their source of economy since ancient times. Agriculture is another exploit for income source by the local community due to rich biodiversity and fertile land of this area. Though mostly educated people move to the urban area by joining different professions but it positively affected the living standards and socioeconomic conditions. There are huge resources of Uranium explored in this area. Furthermore, Limestone, Coal, Oil gas, Gypsum, Bromite, Sand and Gravel are also found. Kurram River flows near Darra Tang and this river join Indus River at the point of Isa Khel and Khaglanwala.

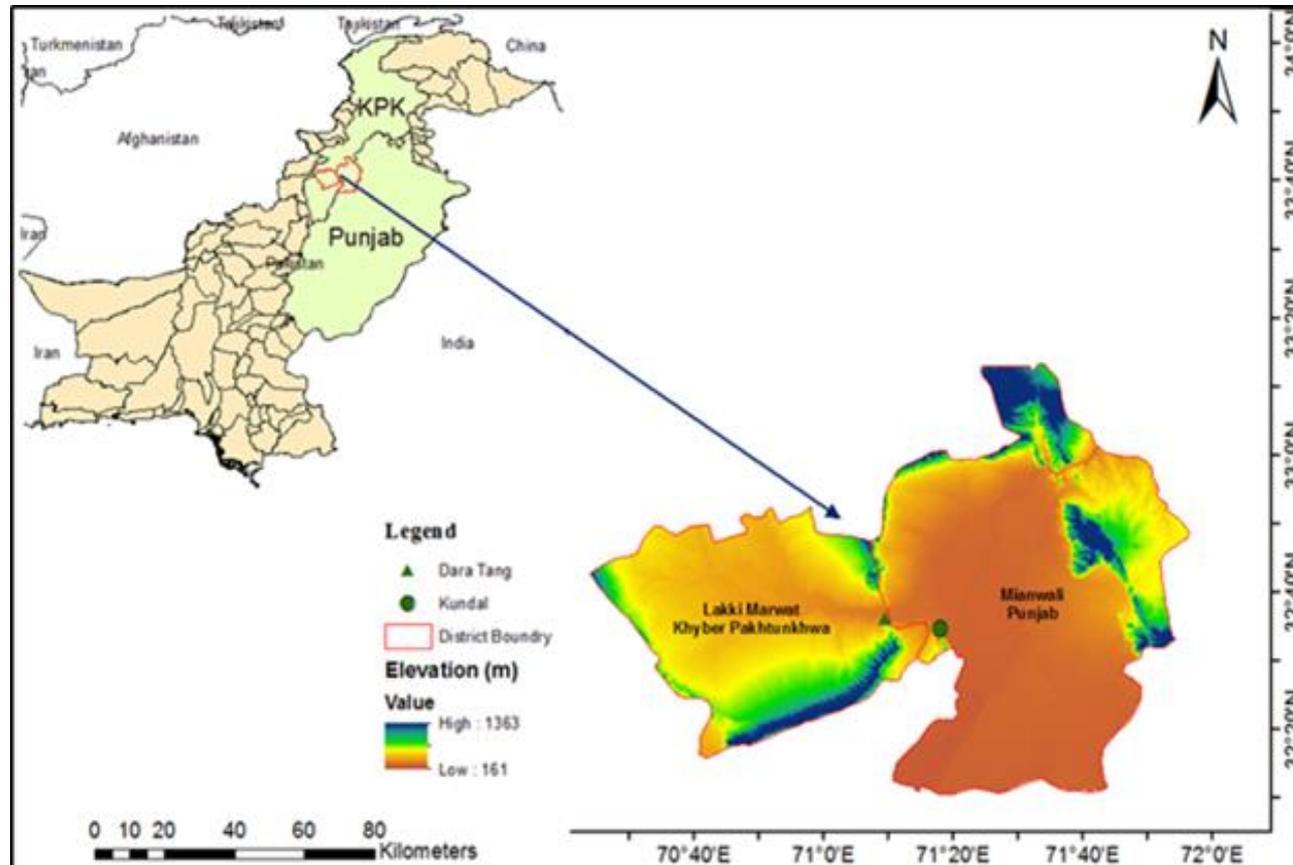


Fig. 1. Geographical location of the study area Darra Tang (LakkiMarwat, Khyber Pakhtunkhwa), kundal (Mianwali, Punjab), Pakistan

**Climate:** The region has all the characteristics of a desert due to its sand dunes, scorching heat and dry weather. Overall temperature is very high in summers while winters are moderately cool. The summer season begins from early April and continues till late October. June is the hottest month with a maximum temperature range of 47 to 50°C and a minimum temperature range of about 30 to 35°C. Periodic sand storms rage through the area during May and June due to the prevalent low humidity. The hot wind, locally known as "Lu" blows across the area in these months. The cold wave starts from early November, so after it winter lasts until February. Though the day time temperature in winter is not too low, however there is always a sharp decrease in nights. The average temperatures during this period are 20 and 4°C respectively. Rainfall is very rare and sporadic that generally occurs in July and August. Average rainfall varies from 326 to 385 mm in Darra Tang and Kundal. Most of the population in this area has lack of basic health facilities as well as literacy (Khanet *et al.*, 2013) (<http://kpktribune.com/index.php/en/lakki-marwat/lakki-marwat-climate>), (<http://en.climate-data.org/location/1058626/>).

**Data collection:** Kundal and Darra Tang has flora with abundant diversity including highest number of medicinal plants that are used by local people for medicine and can also be exploited for pharmaceutical and economical purposes. The data was collected by interacting with indigenous people, performing surveys, semi-structured interviews, key informant discussions and herbal practitioners. During the survey, information was collected from different age group about ethno-medicinal uses of plants to cure various diseases, their vernacular names, method of preparation and administration and specific parts used in specific recipes. Local language was used to collect all the data and performed survey so it enhances the reliability of information regarding various aspect of survey.

**Identification of medicinal plants:** Medicinal plants were identified and collected with their vernacular names after reporting by the indigenous communities and rules were followed in accordance with National biodiversity action plan for Pakistan. After collection, plants were pressed and dried by using blotting paper and taken to the Department of Botany, University of Sargodha, Punjab, Pakistan. Using classification system by Raunkiar's (1934) plants was classified into herbs, shrubs, and trees (Raunkiar, 1934). After identification of plant specimens, Voucher no. were allotted to the plant specimens and authenticated by Flora of Pakistan (Nasir & Ali, 2002) (Table 1).

**Data analysis:** Data collected from ethnobotanical field survey was input and analyzed into database of Microsoft Excel, SPSS 19.0 version and origin 8.5 to demonstrate the ratio of different variables like Plant type, plant parts used, , and number of plants for frequent disease treatment. Number of used plant known by informant and age of informants (individuals) was correlated with the species number, was analyzed by correlation by SPSS 19.0 version.

The relative importance of each traditional plant species (**UVi**) for local use by local informants was calculated applying the use value formula (Phillips *et al.*,

1994). It is a quantitative method that analyzes the relative importance based on their relative use among local population and is denoted with "i". Formula for calculating UV is:

$$UV_i = \frac{\sum U_i}{N_i}$$

Here  $U_i$  is the use reports cited number by each informant for the specific medicinal plant while,  $N_i$  is the informants total number interviewed during this study for the specific species of plant.

## Results and Discussion

**Knowledge of medicinal plant and uses:** Age was correlated with knowledge of plant species and their uses, moreover it has observed that individuals lies between 30-80 years old age know more as compared to the youngest (30> years old) which is similar with some other studies (Estrada-Castillón *et al.*, 2014). Though in our study it is also found that with the increase of age the informant's knowledge about medicinal plants was more enhanced which contradicts the results of some studies that age is not correlated with medicinal uses (Dovie *et al.*, 2008; Teklehaymanot, 2009; Sargin *et al.*, 2013). There was a significant correlation between the known plants number by informant and the age of informant ( $r = 0.082$ ,  $n = 186$ ,  $y = 0.4043x + 16.995$ ,  $p < 0.05$ ) (Fig.3). Moreover, positive correlation was also found between the used plant known by informant and age of informant ( $r = 0.012$ ,  $n = 186$ ,  $y = 0.1307x + 26.756$ ,  $p < 0.05$ ) (Fig.2). Overall community has less knowledge about the traditional uses of plants as they have more access to latest technologies (Sargin *et al.*, 2013).

**Used value (UVi):** The use values of given plant species ranged from 0.1 to 0.98 (Table 1). Important medicinal plant species having highly use values were; *Rhazyastricta* having (UVi= 0.98), *Phoenix dactylifera* (0.96), and *Trianthemaportulacastrum* (0.95) that are indorsed for its uses to cure various ailments and has sound recognition in local people. *Portulacaoleracea* (0.94) is commonly found in the study area and used as treatment for the bleeding of the genito-urinary tract as well as dysentery, purgative and tumors. Other plants having high use vales were *Plantagoovata* (0.93), *Chrozophoraoblongifolia* (0.92) and *Citrulluscolocynthis* (0.91). Whereas the lowest used values for collected plant species were *Cenchrusetigerus* (0.1), *Typhadomingensis* (0.12) and *Cucumismelovar* (0.13), this is due to its limited availability from study area and people use it as diuretic, haemostatic and skin infections. Maximum used values for cited plant taxa is might owing of their extensive occurrence and cultural diversity approach which caused those medicinal plant taxa as the primary choice for disease treatment (Ullah *et al.*, 2014). Table 1 demonstrates all listed plants with following description; their scientific name as well as voucher number, family, vernacular and trade names, growth habit, parts used, common uses, UV and medicinal uses to cure different ailments. Plants which were reported by the local interviews were specified for all the traditional residents of the study region.

Table 1. List of indigenous medicinal plants used by the people of Semi-tribal area Khyber Pakhtunkhwa, Punjab, Pakistan.

Scientific name and voucher no	Family name	Vernacular name	Trade name	Growth habit	Parts used	Common uses	UV	Medicinal uses
<i>Adiantum capillis-veneris</i> L. (Asfa-60187)	Adiantaceae	Khui buti	Persyoshan	Herb	Leaf, Rhizome	Med	0.16	Diuretic, urinary disorders, cold, heart burn, gall stone, jaundice
<i>Blepharis ciliaris</i> (L.) B.L. Burt (Asfa-60188)	Acanthaceae	Neeli pihulon wali kandiari		Herb	Whole plant	Med	0.22	Anti-inflammatory, narcotic, dysmenorrhea and toothache, used for insect bites.
<i>Justicia adhatoda</i> L. (Asfa-60189)	Acanthaceae	Bhaikar	berg-e-Bansa	Shrub	Leaf	Med	0.87	Respiratory and bronchial diseases, cough, asthma
<i>Trianthema portulacastrum</i> L. (Asfa-60190)	Aizoaceae	Isit	Isit	Herb	Stem, Leaf	Med	0.95	Fever, jaundice, liver diseases
<i>Achyranthus aspera</i> L. (Asfa-60191)	Amaranthaceae	Puthkanda	Puthkanda	Herb	Root, Stem, Leaf	Med	0.16	Asthma, boils, bronchitis, cold cough, colic, dysentery, headache, pneumonia, leprosy, used for snake bite and scorpion stings
<i>Aerva javanica</i> (Burm. f.) Juss. ex. Schult. (Asfa-60192)	Amaranthaceae	Bui	Bui	Herb	Flower, Leaf	Med, fodder, fuel	0.54	Stop bleeding, kidney problems, diuretic, expel kidney stones
<i>Amaranthus caudatus</i> L. (Asfa-60193)	Amaranthaceae	Bathu	Jolai surkh	Herb	Leaf, Stem	Med, ornamental	0.50	diuretic, blood purifier, anti-spasmodic
<i>Amaranthus graecizans</i> L. (Asfa-60194)	Amaranthaceae	Paulari	Paulari	Herb	Whole plant	Med, food	0.31	Skin rashes, oedema, scorpion stings and snake bites, piles, gonorrhoea
<i>Alternanthera pungens</i> Kunth. (Asfa-60195)	Amaranthaceae	Kuntha	Kuntha	Herb	Leaf, Fruits	Med, Food	0.54	Diuretic, relieve itching
<i>Amaranthus viridis</i> L. (Asfa-60196)	Amaranthaceae	Cholai	Karund	Herb	Leaf	Med, food	0.25	Scorpion sting and snake bites, flue, fever
<i>Digera muricata</i> (L.) Mart. (Asfa-60197)	Amaranthaceae	Tar rara	Tar rara	Herb	Whole plant	Med, ornamental, food	0.34	Urinary infections, diarrhea, dysentery, cooling agent for the body
<i>Halothammus bottae</i> Jaub & Spach. (Asfa-60198)	Amaranthaceae	Khar buti	Khaar buti	Shrub	Stem, Leaf	Med, Food	0.30	It is used in the treatment of asthma
<i>Ammi majus</i> L. (Asfa-60199)	Apiaceae	Jangli Soya	Jangli Soya	Shrub	Leaf, Seeds	Med	0.44	Kidney disorders, diuretic, Leprosy, urinary tract infections, digestive infections, skin diseases, used against snake bite.
<i>Nerium oleander</i> L. (Asfa-60200)	Apocynaceae	Kanair	Kanair	Herb	Leaf, Roots	Med, ornamental	0.21	Skin diseases, snake bites, for abortion at initial stages
<i>Rhazya stricta</i> Decne. (Asfa-60201)	Apocynaceae	Virran	Kanairi	Herb	Leaf, Fruits	Med, fuel,	0.98	Cooling agent, used for snake bites, skin rashes, eye diseases
<i>Calotropis procera</i> (Aiton) W.T. Aiton (Asfa-60202)	Asclepiadaceae	Akra	Pamankai	Herb	Leaf, Juicy stem, Bark, Root bark	Med	0.70	Leprosy, chronic eczema, diarrhea, dysentery, skin diseases, asthma
<i>Caralluma arabica</i> N.E.Br. (Asfa-60203)	Asclepiadaceae	Peepu	Pamankai	Herb	Juicy stem	Med, ornamental, food	0.45	Used against liver problem, hypotension, diabetes
<i>Caralluma flava</i> N.E.Br. (Asfa-60204)	Asclepiadaceae	Chungan	Pamankai	Herb	Juicy stem	Med, food	0.56	Diabetes, blood pressure, liver ailments
<i>Carthamus oxyacantha</i> M. Bieb. (Asfa-60205)	Asteraceae	Poli	Pohli	Herb	Seed, Leaf	Med, fuel	0.18	Toothache, diabetes, ulcer

Table 1. (Cont'd.).

Scientific name and voucher no	Family name	Vernacular name	Trade name	Growth habit	Parts used	Common uses	UV	Medicinal uses
<i>Carthamus tinctorius</i> L. (Asfa-60206)	Asteraceae	Poli	Milk thistle	Herb	Whole plant	Med, fuel, ornamental	0.64	Used to normalize menstruation, measles fever, skin rashes, laxative, diaphoretic
<i>Eclipta prostrata</i> (L.) L. (Asfa-60207)	Asteraceae	Bhangra	Bhangra	Herb	Whole plant	Med, food	0.77	Headache, toothache, falling hair, eye and ear infections
<i>Sonchus oleraceus</i> L. (Asfa-60208)	Asteraceae	Dhodak	Dodak	Herb	Whole plant	Med	0.34	Urinary infection, kidney problems, laxative
<i>Vernonia cinerea</i> (L.) Less. (Asfa-60209)	Asteraceae	Jeera	Jeera	Herb	Roots, Leaf	Med	0.35	Diarrhea, dysentery, fever, given to children to cure urinary problems, scorpion stings
<i>Heliotropium calcareum</i> Stocks. (Asfa-60210)	Boraginaceae	Kamia tambako	Sufaid bhangra	Herb	Whole plant	Med	0.66	Urinary infections, infection of eye. Poultice is laxative and diuretic
<i>Heliotropium lasiocarpum</i> Fisch. & C.A. Mey. (Asfa-60211)	Boraginaceae	Kamia tambako	Sufaid bhangra	Herb	Leaf	Med	0.29	Infusion of leaves is taken for liver problem
<i>Trichodesma indicum</i> (L.) R.Br. (Asfa-60212)	Boraginaceae	Gaozeban	Gaozeban	Herb	Root, Leaf, Flower	Med, fuel	0.21	Diarrhea, dyspepsia, dysentery, fever, emollient, diuretic, snake bites
<i>Eruca sativa</i> Mill. (Asfa-60213)	Brassicaceae	Tara mira	Tara mira	Herb	Leaf, Seed	Med, salad, food	0.46	Use to heal scorb, stomach problems, kidney problem, stomach disorders
<i>Sisymbrium irio</i> L. (Asfa-60214)	Brassicaceae	Khoob kalan	Khubkalan	Herb	Leaf, Seed	Med	0.37	Fever, common cold, cough, bronchitis, asthma.
<i>Cleome gynandra</i> L. (Asfa-60215)	Capparidaceae	Hulhul	Hulhul	Shrub	Root, Leaf	Med	0.52	Anemia, used to improve eye site, marasmus
<i>Capparis decidua</i> (Forssk.) Edgew. (Asfa-60216)	Capparidaceae	Karein	Kabra	Shrub	Young shoot, Fruit, Root, Root bark	Med, fuel, timber	0.34	Swellings, astringent, rheumatism
<i>Chenopodium album</i> L. (Asfa-60217)	Chenopodiaceae	Bathu	Bathu	Shrub	Root, Leaf, Seed	Med, fodder, food	0.68	Jaundice, urinary problems, used as intestinal worm killer, laxative
<i>Chenopodium murale</i> L. (Asfa-60218)	Chenopodiaceae	Bathu	Bathu	Shrub	Leaf	Med, fodder, food	0.61	Decoction of leave is used for the treatment of juardance, liver diseases
<i>Convolvulus arvensis</i> L. (Asfa-60219)	Convolvulaceae	Vahri	Vahri	Herb	Tender shoot	Med, ornamental	0.65	Abdominal problems, constipation, skin disorders, control dandruff
<i>Convolvulus prostratus</i> Forssk. (Asfa-60220)	Convolvulaceae	Shirin dodak	Shirin dodak	Herb	Whole plant	Med, ornamental	0.20	Chronic fever, jaundice, nerve tonic, chronic bronchitis, digestive problems, skin diseases, asthma
<i>Citrullus colocynthis</i> (L.) Schrad. (Asfa-60221)	Cucurbitaceae	Gharunba	Tuma	Herb	Fruit, Leaf, Root	Med, food	0.91	Mastitis, arthritis, fever, tumors, ascities, ulcers, asthma, bronchitis, jaundice enlargement of spleen, tuberculosis, dyspepsia, constipation
<i>Cucumis melo</i> var. <i>Argretis</i> Naudin (Asfa-60222)	Cucurbitaceae	Chibbar	Chibbar	Herb	Leaf, Flower, Fruit,	Med, food	0.13	Skin infections, stomach problem, treatment of burn, abrasions
<i>Cuscuta chinensis</i> Lam. (Asfa-60223)	Cuscutaceae	Wan werhi	Wan werhi	Herb	Whole plant	Med, fodder	0.53	Leucorrhea, frequent micturition, threatened abortion, chronic diarrhea, chronic ulcers, wounds. Poultice is applied on painful inflammation
<i>Cuscuta planiflora</i> Ten. (Asfa-60224)	Cuscutaceae	Small seed dodder	Small seed dodder	Herb	Whole plant	Med	0.59	Tuberculosis, contraceptive, relief pain of insect's stings. Good remedy for urinary tract problems

Table 1. (Cont'd.).

Scientific name and voucher no	Family name	Vernacular name	Trade name	Growth habit	Parts used	Common uses	UV	Medicinal uses
<i>Chrozophora oblongifolia</i> (Delile) Spreng. (Asfa-60225)	Euphorbiaceae	Kamla tambaco	Kuronda	Herb	Leaf, Fruit	Med, washing	0.92	Fever, wound healing properties, used to heal fissures
<i>Euphorbia granulata</i> Forssk. (Asfa-60226)	Euphorbiaceae	Dodhak	Dodhak	Herb	Whole plant	Med	0.42	Diuretic, purification, fever, cough, snake bites and scorpion stings, aching teeth
<i>Euphorbia hirta</i> L. (Asfa-60227)	Euphorbiaceae	Dudli	Dudli	Herb	Whole plant	Med, fodder	0.74	Diarrhea, peptic ulcer, vomiting, asthma, bronchitis, cough and cold, snake bites and scorpion stings, jaundice, malaria
<i>Euphorbia larica</i> Boiss. (Asfa-60228)	Euphorbiaceae	Dodhak	Dodhak	Herb	Whole plant	Med, fodder	0.64	Urinary infections, liver disorders, asthma, bronchitis
<i>Ricinus communis</i> L. (Asfa-60229)	Euphorbiaceae	Harnoli	Arind	Shrub	Leaf, Seed	Med, shelter	0.70	Eye infections, stomach problems, skin infections, purgative
<i>Melilotus indica</i> (L.) All. (Asfa-60230)	Fabaceae	Seinji	Seinji	Herb	Leaf, Seed	Med, food, shelter	0.47	Abdominal pain, diarrhea, stomach problems, indigestion, genital diseases, skin infections
<i>Senna italica</i> Mill. (Asfa-60231)	Fabaceae	Senegal senna	Senegal senna	Herb	Leaf, Flower, Root	Med, fodder, ornamental	0.56	Stomach complaints, fever, jaundice, indigestion, liver complaints, gall bladder disorders, nausea, vomiting, diarrhea
<i>Tephrosia nubica</i> (Bioss.) Baker (Asfa-60232)	Fabaceae	Pochki	Pochki	Shrub	Leaf, Seed, Root	Med, cosmetics	0.49	Throat and lung complaints, laxative, diuretic, bronchitis, pimples, cough, kidney disorder, vomiting
<i>Fumaria indica</i> (Hausskn.) Pugsf. (Asfa-60233)	Fumariaceae	Papra	Shatara	Herb	Whole plant	Med, fodder	0.69	Diaphoretic, diuretic, diarrhea, blood purification, fever and as a liver tonic for hepatic ailment
<i>Fumaria parviflora</i> Lam. (Asfa-60234)	Fumariaceae	Shahtra	Shahtra	Herb	Leaf, Seed	Med, fodder	0.18	Laxative, dyspepsia, skin rashes, digestive problems, diuretic, fever, common cold, cough, constipation
<i>Malva parviflora</i> L. (Asfa-60235)	Malvaceae	Pochki	Pochki	Herb	Seed, Leaf, Root	Med, cosmetics, fodder	0.70	Poultice and applied on swellings, cough, common cold, ulcer in the bladder, hair rinse to remove dandruff and to soften the hair
<i>Acacia nilotica</i> (L) Delile. (Asfa-60236)	Mimosaceae	Kikar	Kikar, Babul acacia	Tree	Leaf, Root, Bark, Gum	Med, shelter, Timber	0.69	Diarrhea, dysentery, leprosy, ulcers, tuberculosis, diabetes. Gum of the tree is highly nutritive and useful for pregnant mothers
<i>Dalbergia sissoo</i> Roxb. ex DC. (Asfa-60237)	Mimosaceae	Tahli	Shisham	Tree	Leaf, Bark, Timber	Med, shelter, Timber	0.79	Anal disorders, blood diseases, burning sensation, dysentery and dyspepsia, diseases, stomach problems, nausea, vomiting, eye and nose disorders, eye ailment
<i>Prosopis cineraria</i> (L.) Druce. (Asfa-60238)	Mimosaceae	Jandi	Kandi	Tree	Flower, Leaf, Bark,	Med, shelter, Timber	0.89	Used during pregnancy as safeguard against miscarriage, leprosy, dysentery, bronchitis, asthma and hemorrhoids, cough and common cold, snake bite and scorpion stings
<i>Prosopis juliflora</i> (Sw.) Dc. (Asfa-60239)	Mimosaceae	Vilayti khejra	Vilayti kikar	Tree	Above ground parts	Med, shelter, Timber, food	0.86	Stomach problems, skin lesions, expectorant
<i>Peganum harmala</i> L. (Asfa-60240)	Nitriaceae	Harmul	Harmal	Herb	Seed	Med	0.72	Antispasmodic, fever, colics, retention of urine, cough and other pectoral diseases
<i>Boerhavia diffusa</i> L. (Asfa-60241)	Nyctaginaceae	Itsit	Itsit	Herb	Leaf, Root	Med, food	0.62	Diuretic, jaundice, hepatitis, laxative, gonorrhoea and anaemia. Poultice of the roots is applied on skin infection to kill the worms
<i>Plantago ovata</i> Forssk. (Asfa-60242)	Plantaginaceae	Isabgol	Isabgol	Herb	Above ground parts	Med	0.93	Urinary infections, stomach problems, ulcers, diarrhea, hemorrhoids, dysentery, genitourinary tract.

Table 1. (Cont'd.).

Scientific name and voucher no	Family name	Vernacular name	Trade name	Growth habit	Parts used	Common uses	UV	Medicinal uses
<i>Calligonum comosum</i> L. He'ṛ (Asfa-60243)	Polygonaceae	Arta	Arta	Shrub	Leaf, Stem	Med, fodder	0.18	Stomach problem, fever, ure of thelmic problems, treat scabies, toothache
<i>Rumex dentatus</i> L. (Asfa-60244)	Polygonaceae	Ambvati	Ambvati	Herb	Root, Leaf	Med, fodder, food	0.26	Diuretic, astringent, cutaneous disorders. Root powder act against constipation, laxative, emollients.
<i>Portulaca oleracea</i> L. (Asfa-60245)	Portulacaceae	Lunak sag	Kulfa	Herb	Whole plant	Med, food, ornamental	0.94	Bleeding of the genito-urinary tract, dysentery, relieve sores, insects or snake bites on the skin, digestive system, fever, tumors, toothache
<i>Anagalis arvensis</i> L. (Asfa-60246)	Primulaceae	Niiti buti	Dhabbar	Herb	Above ground parts	Med, fodder, ornamental	0.54	Cerebral affection, leprosy, hydrophobia, epilepsy, mania, used against snake bites
<i>Ziziphus jujuba</i> Mill. (Asfa-60247)	Rhamnaceae	Beri	Ber	Tree	Leaf, Fruit, Root	Med, food, timber	0.75	Skin infection where pus is present, iron deficiency, falling hairs, blood purification, wounds, ulcers
<i>Ziziphus nummularia</i> (Burm. f) W.Arn. (Asfa-60248)	Rhamnaceae	Beri	Ber	Tree	Leaf, Fruit	Med, food, timber	0.83	Stomach problem, scabies, boils. Decoction of leaves used in washing dead bodies, falling hairs.
<i>Salvadora oleoides</i> L. (Asfa-60249)	Salvadoraceae	Pilo, jhal	Pilo	Herb	Leaf, Fruit	Med, fodder, timber, fuel	0.56	Mouth wash, rheumatism in animals, snake bite, constipation, piles, tumors, bronchitis
<i>Dodonaea viscosa</i> Jacq. (Asfa-60250)	Sapindaceae	Snatha	Sanatha	Shrub	Leaf, Fruit	Med, fuel,	0.58	Diarrhoe, stomach acidity, skin diseases, muscles problems
<i>Datura stramonium</i> L. (Asfa-60251)	Solanaceae	Dhatura	Datura	Herb	Peel, Leaf, Flower	Med, fodder	0.32	The peels from dried stamp and branches are placed over affected parts of the body and burnt to treat rheumatic diseases, asthma, muscle, joints, never pains
<i>Solanum incanum</i> L. (Asfa-60252)	Solanaceae	Asind	Asind	Herb	Fruit, Leaf, Root	Med	0.26	Dyspepsia, chest troubles, earache and relief pain, haemorrhoids, bruises
<i>Withania coagulans</i> Dun. (Asfa-60253)	Solanaceae	Khamjeera	Asgand	Herb	Leaf, Fruit	Med, food, fodder	0.69	Purification of blood, cooling, chronic liver complaints, dyspepsia, colic, gastro infections
<i>Withania somnifera</i> (L.) Dun. (Asfa-60254)	Solanaceae	Asgand	Asgand	Herb	Whole plant	Med,	0.87	Asthma, fever, and cough. hydrocele, leukorrhoea, menorrhagia, sexual potency and fertility, painful swellings, ulcer
<i>Tamarix aphylla</i> (L.) Karst. (Asfa-60255)	Tamaricaceae	Khagal	Farash	Tree	Leaf, Bark	Med, fodder, timber	0.75	Eczema, capitis, jaundice, rheumatism, wound, abscesses
<i>Tamarix dioica</i> Roxb. ex Roth (Asfa-60256)	Tamaricaceae	Khagal	Farash	Tree	Leaf	Med, Agri. tool	0.81	Lice infestation
<i>Tamarix gallica</i> L. (Asfa-60257)	Tamaricaceae	Manna	Manna plant	Tree	Leaf	Med, timber	0.78	Astringent, diuretic, wounds to stop the bleeding, diarrhoea, dysentery, laxative
<i>Corchorus trilocularis</i> L. (Asfa-60258)	Tiliaceae	Malta jute	Malta jute	Herb	Leaf, Seed, Root	Med	0.41	Cure syphilis, tumor, skin diseases and stomach problems, fever
<i>Phyla nodiflora</i> (L.) Greene. (Asfa-60259)	Verbenaceae	Bukken	Bukken	Herb	Above ground parts	Med, fodder	0.16	Jaundice,boils, mouth, gum, earache, toothache, eyeache, purify blood
<i>Fagonia bruguieri</i> DC. (Asfa-60260)	Zygophyllaceae	Dhmaya	Dhamasa	Herb	whole plant	Med, fodder,	0.78	Asthma, fever, thirst and vomiting, dysentery, toothache, stomatitis, snake bite
<i>Tribulus terrestris</i> L. (Asfa-60261)	Zygophyllaceae	Bhakkra	Bhakkra	Herb	Seed, leaf	Med	0.21	Back pain, gonorrhoea, urogenital diseases. Fruit powder is given orally to cure impotency by men

Table 1. (Cont'd.).

Scientific name and voucher no	Family name	Vernacular name	Trade name	Growth habit	Parts used	Common uses	UV	Medicinal uses
<i>Nanorrhops ritchieana</i> (Griffith) Aitch. (Asfa-60262)	Arecaceae (Palmae)	Mazri	Mazri	Tree	Leaf, Fruit	Med, timber	0.56	Hard tips of fruit were used in slingshots and even as substitutes for bullets. It is used with goat skin to make milking bowls
<i>Phoenix dactylifera</i> L. (Asfa-60263)	Arecaceae (Palmae)	Khaji	Khajjoor	Tree	Leaf, Fruit, Terminal buds	Med, food, timber, making mats	0.96	Aphrodisiac, tonic, intestinal problems. The ash of kernels in eye lotion is used to heal blepharitis, laxative
<i>Cyperus rotundas</i> L. (Asfa-60264)	Cyperaceae	Motha	Motha	Herb	Whole plant	Med, fodder	0.63	Leprosy, fever, blood diseases, dysentery, vomiting, epilepsy, skin diseases, irregular menstruation
<i>Juncus rigidus</i> Desf. (Asfa-60265)	Juncaceae			Herb	Root	Med, making mats	0.39	Roots are used for medicines, swelling and edema
<i>Aloe vera</i> L. (Asfa-60266)	Liliaceae	Quar gandal	Ghikuar	Shrub	Above ground parts	Med, cosmetics	0.68	Rheumatism, backache and constipation, digestive problems, heart burn, skin infections
<i>Asparagus falcatus</i> L. (Asfa-60267)	Liliaceae		Allipali	Herb	Whole plant	Med, fodder, ornamental	0.37	The plant is used to treat bronchitis and asthma
<i>Asphodelus tenuifolius</i> Cav. (Asfa-60268)	Liliaceae	Piazi	Piazi	Herb	Leaf, Seed		0.88	Laxative, diuretic, ulcers, toothache, toxemia, kidney stone
<i>Arundo donax</i> L. (Asfa-60269)	Poaceae	Narrki	Narrki	Shrub	Whole plant	Med, timber, fodder	0.78	Analgesic, diuretic, fever, dysfunctional organs of the cattle, blood pressure
<i>Avena fatua</i> L. (Asfa-60270)	Poaceae	Javi	Javi	Herb	Whole plant	Med, fodder	0.22	stomach problems, body cooling
<i>Cenchrus ciliaris</i> L. (Asfa-60271)	Poaceae			Herb	Whole plant	Fodder	0.54	Plant is used as a fodder
<i>Cenchrus setigerus</i> Vahl. (Asfa-60272)	Poaceae		Cow sand burn	Herb	Above ground parts	Med, fodder	0.10	Skin diseases, diuretic, emollient, kidney pain, tumors, sores, wound
<i>Cymbopogon commutatus</i> (Stend) Stapf. (Asfa-60273)	Poaceae			Herb	Whole plant	Med	0.64	It is used as insect repellent
<i>Cynodon dactylon</i> (L.) Pers. (Asfa-60274)	Poaceae	Khable	Khable	Herb	Leaf, Root	Med, fodder	0.65	Cough, hemorrhoids, wounds, diuretic, kidney problem
<i>Dactyloctenium aegyptium</i> (L.) P. Beauv. (Asfa-60275)	Poaceae	Chhaibunrr	Chhaibunrr	Herb	Above ground parts	Med, fodder	0.39	Fever, small pox
<i>Dichanthium annulatum</i> (Forssk.). (Asfa-60276)	Poaceae			Herb	Whole plant	Med, fodder	0.59	Diarrhea.
<i>Digitari sanguinalis</i> (L.). (Asfa-60277)	Poaceae			Herb	Above ground parts	Med, fodder	0.41	Diabetes
<i>Echinochloa colona</i> (L.) Link. (Asfa-60278)	Poaceae			Herb	Leaf, Seed	Med, fodder	0.54	Digestive problem, constipation
<i>Phragmites australis</i> (Cav) Trin ex stend. (Asfa-60279)	Poaceae			Shrub	Whole plant	Med, fodder, timber	0.32	Vomiting, bronchitis, cholera, diarrhea, cough, urinary tract infections
<i>Typha domingensis</i> Pers. (Asfa-60280)	Typhaceae	Koondar	Lucka	Herb	Leaf, Pollen	Med, fodder	0.12	Diuretic, astringent, diuretic, haemostatic, nose bleeds, haematemesis, haematuria, uterine bleeding, abscesses

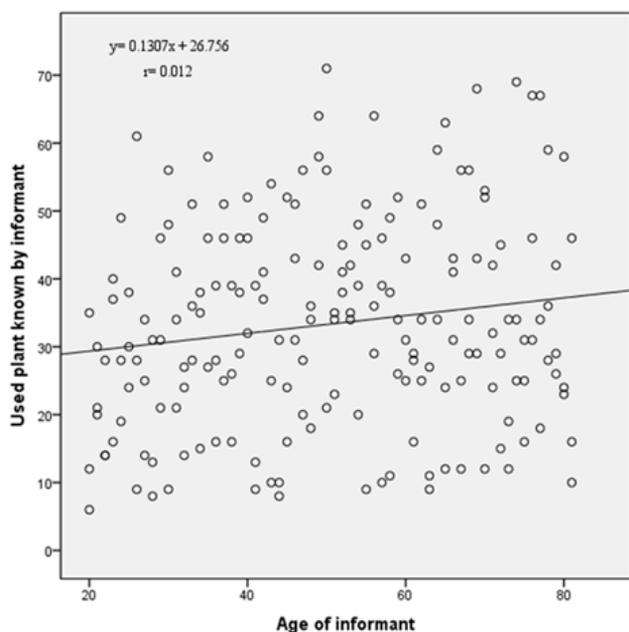


Fig. 2. Correlation between age of informant and used plant known by informant for residents in Darra Tang (LakkiMarwat, Khyber Pakhtunkhwa), kundal (Mianwali, Punjab), Pakistan. There was a positive correlation between variables.

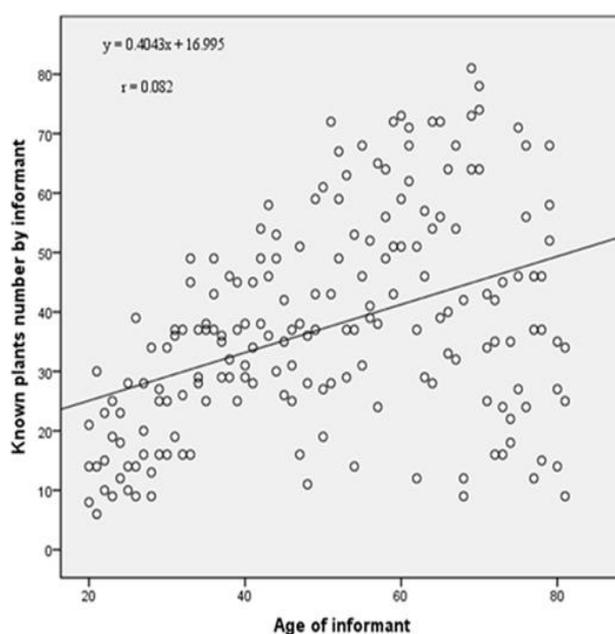


Fig. 3. Correlation between age of informant and known plants number by informant for residents in Darra Tang (LakkiMarwat, Khyber Pakhtunkhwa), kundal (Mianwali, Punjab), Pakistan. There was a positive correlation between variables.

Previous scientific publications authenticated the medicinal assets of the plant species that are stated in the present research using pharmacological evaluates. Our study demonstrated that local therapist use these plants to treat various human ailments (Table 1). Other communities also use these plants to treat different disorders. The seeds of *Plantagoovata* are used to treat jaundice (Rashid *et al.*, 2012), diarrhea, dysentery (Sharma & Kumar, 2007), hyperacidity, hepatic disorders (Kabir *et al.*, 2014), constipation, and spermatorrhea (Marwat *et al.*, 2008). *Withaniacoagulans* fruits and leaves are used to treat blood dermatological problems, hepatic disorders, flatulent colic, diabetes and dyspepsia (Panhwar & Abro, 2007), and as also used as purifier, sedative, diuretic, refrigerant and stomachic (Ullah *et al.*, 2010). An inclusive range of human disorders is cured with the whole plant preparations of *Calotropisprocera*, including snake and scorpion bites, asthma, skin infections, piles, backache, and cough (Saqib *et al.*, 2014; Bhatia *et al.*, 2015). (Abbasi *et al.*, 2010) reported, this plant is also used to treat ringworms, combat eczema, abdominal cramps and carbuncles, to soften the affected area and comfort the removal of date spines from the body and helical remedial.

**Taxonomic diversity of medicinal plants:** The flora of the Kundal and Darra Tang provides diverse valuable species. A total of 94 taxa are assembled and used traditionally to treat various human diseases in the study areas. These medicinal species were taxonomically classified among 40 families (Table 1). The leading family Poaceae was signified by the highest number of species (11) followed by Amaranthaceae (eight species), Asteraceae, Euphorbiaceae (each five spp), Mimosaceae, Solanaceae families (four spp), Asclepediaceae, Boraginaceae, Fabaceae, Tamaricaceae, Liliaceae (three spp), Acanthaceae, Apocynaceae, Brassicaceae, Capparidaceae, Chenopodiaceae, Convolvulaceae,

Cucurbitaceae, Cuscutaceae, Fumariaceae, Polygonaceae, Rhamnaceae, Zygophyllaceae, Arecaceae families (each two spp). The residual 15 families that were stated included one medicinal plant species respectively (Tables 1 and 2). Adiantaceae family with one species ranked representing Pteridophytes group. A majority of the pants from study area belong to the Poaceae, Amaranthaceae, Asteraceae, Euphorbiaceae, Mimosaceae and Solanaceae families, which specifies that these families are symbolic remedial species. The supremacy of medicinal plant species from these families may be credited to their broader abundance, distribution in the study site and leading herbaceous habitat. Additionally, the wide application of species from these families might transmit to the presence of real bioactive constituents against ailments (Gazzaneo *et al.*, 2005; Ullah *et al.*, 2014). Ethnomedicinal knowledge about specific utilization of a plant is conveyed from elders to younger people orally, often from generation to generation. Our investigations were parallel to other investigations from different regions of Pakistan (Sultana *et al.*, 2006; Bahadur, 2011; Saqib *et al.*, 2014).

The present study revealed that the herbs (73%) were primary source of treatment among 94 plant species, tracked by shrubs (15%) and trees (12%) (Fig. 5). This segment was comparable to ethnomedicinal studies carried out in Khyber Pakhtunkhwa, Punjab and other regions of the world (Upriety *et al.*, 2010; Ahmad *et al.*, 2014). Some other scientist report was contradictory to these results that majority of plants were woody (55%) (Hajdu & Hohmann, 2012). The fact that the maximum curative plants species are herbs could be because of the specific geographical position of the study area where the diversity of shorter plants (herbs or shrubs) is higher than that of trees. Our studies match with other scientists who demonstrated in their case study (Kerala Valley, India) that most of the plants constituted on herbs (73%) (Yabesh *et al.*, 2014).

**Table 2. List of medicinal plants and recipes used in Semi-tribal area Khyber Pakhtunkhwa, Punjab, Pakistan.**

Medicinal plant	ROA	Administration recipes
<i>Ziziphusnummularia</i> (Burm. f) W. Arn.	Oral, Topical	Fruits are boiled and then decoction is used to cure stomach problems. Leaves are grinded and this paste is used for the treatment of scabies, boils and to stop hair loss. Leaf decoction is also used in washing dead bodies
<i>Ziziphusjuzuba</i> Mill.	Oral, Topical	Leaves and seeds used against skin infection where pus is present as the plant has antimicrobial and antifungal activity. Fruit decoction is used for treating iron deficiency and blood purification and it is given after meal two times in a day. The powdered root is applied as poultice to wounds and ulcers
<i>Withaniasomnifera</i> (L.) Dun.	Oral, Topical	Whole plant decoction is given to treat hydrocele, leukorrhoea, and menorrhagia. It is also use to increase sexual potency and fertility. Leaf decoction is used to cure constipation, painful swellings and ulcer. Burnt root powder is used with hot water three times in a day to treat asthma, fever, and cough
<i>Withaniacoagulans</i> Dun.	Oral	Fruits and leaves extract is used for purification of blood and cooling effect. Decoction of fruits after filtration is used to cure chronic liver complaints, dyspepsia, colic and gastro infections
<i>Trianthemaportulacastrum</i> L.	Oral	Leaf and stem parts are grinded in water and then after filtration obtained juice is taken orally 2-3 times a day to cure fever, jaundice and liver diseases
<i>Tamarixgallica</i> L.	Oral, Topical	Leaves are boiled in water and taken after eating soft food three times a day to treat the diarrhea and dysentery. Leaves are crushed and then this paste is applied on the wounds to stop the bleeding
<i>Tamarixdioica</i> Roxb. ex Roth.	Oral	Leaf decoction is used to treat lice infestation, urinary problems and splenetic inflammation
<i>Tamarixaphylla</i> (L.) Karst.	Oral, Topical	Leaves are kept in water for 30 minutes and are boiled and filtered. This decoction is used 3 times a day to cure jaundice. Leaves and bark are boiled for 10 minutes and then tied on the skin to cure abscesses, wound, eczema and rheumatism
<i>Ricinuscommunis</i> L.	Oral, Topical	Infusion of leaves is used to cure eye infections while leaf decoction is used for stomach problems. Dried leaves are smoked to cure skin infections and burn. Oil extracted from seeds (castor oil) is quite purgative and given orally to infants for relieving stomach disturbance
<i>Rhazystricta</i> Decne.	Oral, Topical	Infusion of fresh leaves is used in bath water as cooling agent. Leaves are boiled and this water is used as gargle to cure throat problems. The powdered leaves and fruits are applied on skin to treat rashes. Extract of fresh fruits is taken to cure for snake bites and eye diseases
<i>Prosopisjuliflora</i> (Sw) Dc.	Oral	Aerial parts are cooked and taken with other foods in the meal for good digestibility. Decoction of plant is good for stomach problems and skin lesions
<i>Prosopis cineraria</i> (L.) Druce.	Oral	Flower is pounded, mixed with sugar and taste becomes sweet which is used during pregnancy as safeguard against miscarriage. The bark of the tree is boiled in the water and used as a tea to cure leprosy, dysentery, bronchitis, asthma and hemorrhoids. Fresh leaves are grounded and boiled in water and then used to cure cough and common cold. Flower and leaves decoction is also used for the treatment of snake bite and scorpion stings
<i>Portulacaoleracea</i> L.	Oral, Topical	Decoction of plant is used to treat infection are bleeding of the genito-urinary tract as well as dysentery. The fresh herb is also applied topically to relieve sores and burning due to biting of insects or snake bites on the skin. Infusion of leaves is used to refresh the digestive system as well as to cure fever, tumors and toothache
<i>Plantagoovata</i> Forssk.	Oral	Decoction of seeds taken 3 times a day to treat urinary infections and stomach problems. Infusions of seeds are taken as to cure boils and ulcers. Aerial parts are boiled and taken with meal to cure the diarrhea, hemorrhoids, dysentery and genitourinary tract problems
<i>Phoenix dactylifera</i> L.	Oral, Topical	Four to five green dates are boiled in the milk for some time and then used as aphrodisiac and tonic. Terminal buds are eaten to heal intestinal problems. The ash of kernels in eye lotion is used to heal blepharitis. Fruits re eaten after meal and has laxative properties. Bath with boiled leaves water is used to cure skin diseases

Table 2.(Cont;d.).

Medicinal plant	ROA	Administration recipes
<i>Peganumharmala</i> L.	Oral	The seeds are antispasmodic and taken in the treatment of fever, cough and colic. A decoction of crush seeds is also useful in mouthwash in laryngitis. Seeds are burnt and its smoke is used to cure the redness and irritation of eyes
<i>Justiciaadhatoda</i> L.	Oral	Fresh leaves are taken and made into paste. Then this paste is given to the patients two times a day to relieve cough and asthma. This remedy is used to cure all kind of respiratory and bronchial diseases
<i>Fagoniabruquieri</i> DC.	Oral	Whole plant is boiled and used as a tea to cure the treatment of asthma, fever, thirst and vomiting. Decoction  of plant leaves use in the treatment of dysentery, toothache and stomatitis. It is also used in cure of snake bite.
<i>Euphorbia hirta</i> L.	Oral, Topical	Decoction of plant is taken orally to treat diarrhea, peptic ulcer and vomiting. It is also used to treat asthma, bronchitis, cough and cold. Plants are crushed and make the paste which is directly applied on the affected part to relief pain of snake bites and scorpion stings. Aerial parts are boiled for 20 minutes and then given to the patients for the treatment of jaundice and malaria
<i>Ecliptaprostrata</i> (L.) L.	Oral	Juice of fresh plant is used to cure headache, toothache, falling hair and skin problems. Leaf juice is alsotaken orally for eye and ear infections.
<i>Dalbergiasissoo</i> Roxb. ex DC.	Oral, Topical	Eight to ten leaves taken and make grounded paste which is used with 20gm palm candy every morning to cure menstruation problems. 50-100 ml decoction of bark is used twice in a day to cure anal disorders, blood diseases, burning sensation, dysentery and dyspepsia. 10-15 ml of leaf juice used orally to cure skin diseases, stomach problems, eye and nose disorders. Oil obtained from grinded seeds is used on the skin to treat itching, scabies and burning
<i>Citrulluscolocynthis</i> (L.) Schrad.	Oral	Roots boiled in the cow's milk with the ratio of 1:6 and used orally 5 ml to cure amenorrhoea. Decoction of fruit is useful to cure fever, tumors, ascities, ulcers, asthma and bronchitis and administered three times a day. Extract of fresh leaf is obtained and is directly applied on the skin to cure skin infections. Fruit is administered to cattle for intestinal disorders
<i>Chrozophoraoblongifolia</i> (Delile) Spreng.	Oral	Decoction of leaf is directed to cure dysentery, fever and cleansing the bowels. Fruit juice in water is administered as eye drops three times a day to cure otitis and other eye infections
<i>Chenopodium album</i> L.	Oral	Roots are boiled in water until the water left half and then 250 ml given to the patient twice a day to treat in jaundice and urinary problems. Oil extracted from seeds is taken orally as intestinal worm killer. The leaves are used as a vegetable and fried with oil and also cook with meat and taken in a meal
<i>Calotropisprocera</i> (Aiton) W.T. Aiton	Oral, Topical	Decoction of root bark is widely used for treatment of malaria, leprosy, chronic eczema, diarrhea, dysentery and skin diseases. Dried leaves powder with water is used to cure asthma, bronchitis, leprosy and eczema. Juice from the stem applied topically to release the muscles pain
<i>Asphodelustenuifolius</i> Cav.	Oral, Topical	Leaf decoction is given in toxemia and kidney stone. Seeds are used for toothache and also applied externally to ulcers and inflamed parts of the body
<i>Arundodonax</i> L.	Oral	Decoction of aerial parts of plant is used to treat fever and dysfunctional organs of the cattle. Decoction of leaves is taken to reduce blood pressure and cure malaria
<i>Aloe vera</i> L.	Oral, Topical	Fresh leaf pulp is cooked with ghee, sugar and wheat flour and is given three times a day for the treatment of rheumatism, backache and constipation. Plant juice is used for digestive problems, heart burn and skin infections. Plant extract is also topically used on skin to treat pimples, acne and boils
<i>Acacianilotica</i> (L) Delile.	Oral, Topical	Decoction of root and bark is used twice a day for diarrhea, dysentery and leprosy. Leaves are poulticed and used to treat ulcers. Root is also used to cure tuberculosis. Gums are used as tonic also taken for curing diarrhea, dysentery and diabetes. Gum is highly nutritive and useful for pregnant mothers

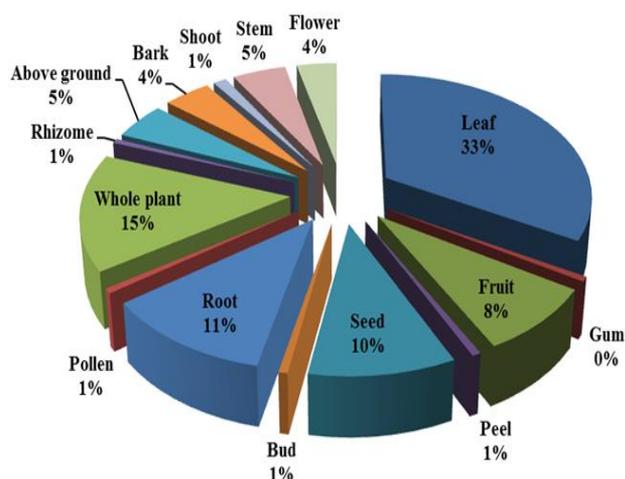


Fig. 4. Percentage of Plant parts utilized and mode of herbal recipes in Darra Tang (LakkiMarwat, Khyber Pakhtunkhwa), kundal (Mianwali, Punjab), Pakistan.

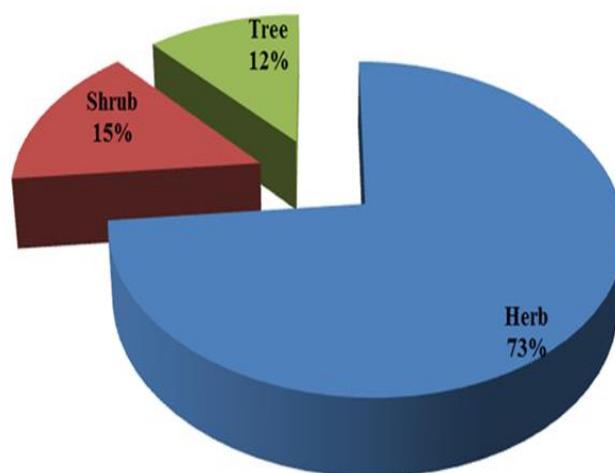


Fig. 5. Growth habit representations of medicinal plants in Darra Tang (LakkiMarwat, Khyber Pakhtunkhwa), kundal (Mianwali, Punjab), Pakistan

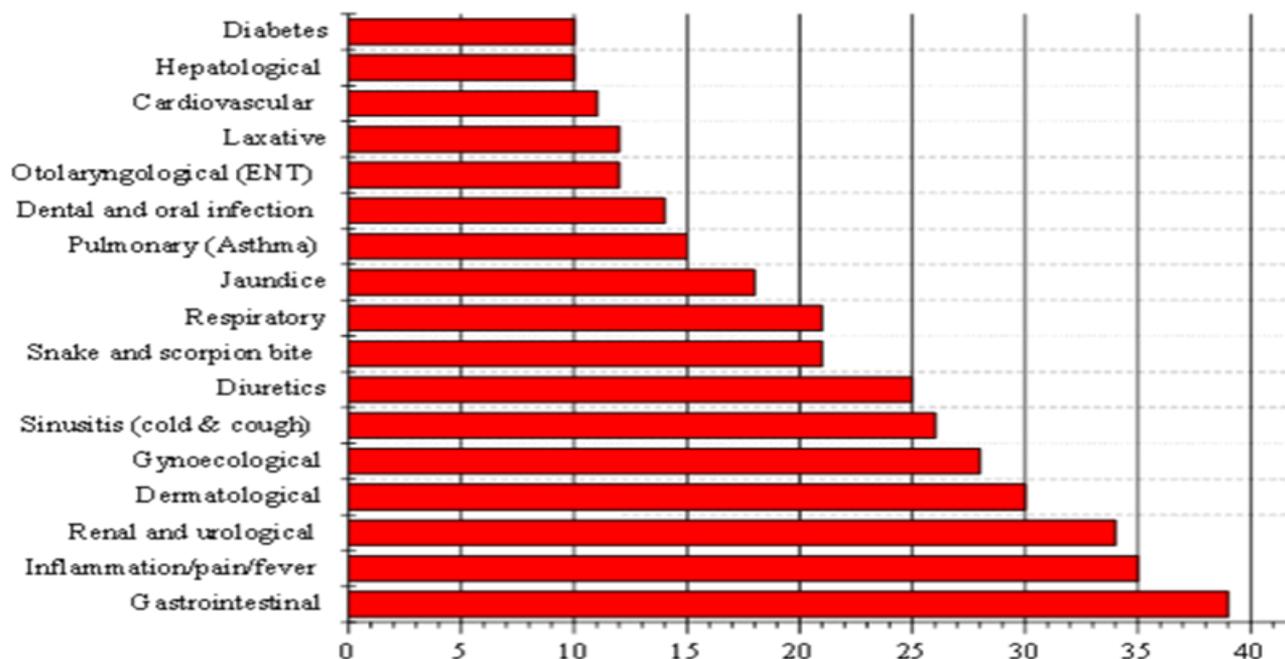


Fig. 6. Main disease recorded and number of medicinal plant species used to heal them in Darra Tang (Lakki Marwat, Khyber Pakhtunkhwa), kundal (Mianwali, Punjab), Pakistan.

**Plant part used in herbal recipes:** In the present analysis, we found that almost all parts of the plant species were commonly utilized. Leaves of plants were mostly used (33%) by people of the Kundal and Darra Tang, LakkiMarwat, followed by whole plant mostly in the case of herbs (15%), root (11%), seed (10%), fruit (8%), stem and areal part (5%), flower and bark (4%) and rhizome, shoot, pollen, bud and peel (1%) in descending law (Fig. 4). Generally more than one part of the same species is utilized in different herbal recipes and medicines. In previous stated work from different parts of the Pakistan (Khyber Pakhtunkhwa and Punjab) whole plant and root treatment is very common and it inhabits the top of the plant parts usage (Qureshi *et al.*, 2009; Mahmood *et al.*, 2013). Roots, seeds or rhizomes and fruits are the most important parts, probably as they hold higher extent of bioactive compounds compare to other

parts (Srithi *et al.*, 2009). The most frequently used plant parts (such as leaves and roots) were used to prepare the traditional medicines (Fig. 6). This report is in agreement with some other studies that leave were the common plant part used by the local people (Giday *et al.*, 2003; Ayyanar & Ignacimuthu, 2005; Amri & Kisangau, 2012). This uncontrollable practice keeps a pressure on medicinal plant flora and possibly this is the cause that many treasured medicinal plants are computed as threatened species (*Calotropisprocera*, *Caralluma Arabica* and *Carallumaflava*) in the study area (Table 1). In a previously published explosion from Leepa Valley, Pakistan *Sussurialappa* which is vastly medicinal in its properties and have maximum use value was acknowledged as threatened species (Mahmood *et al.*, 2012). Harvesting of whole plant and underground plant parts is not practicable (Flatie *et al.*, 2009). This exposure

is a hazard to the existence of the majority of medicinal plants used by the native communities of Khyber Pakhtunkhwa and Punjab region.

**Herbal recipes and mode of preparation:** There were several routs of traditional administration recipes for the cure of different diseases. The medical remedies were ingestion to treat most complaints (Table 2), different kinds of preparation made out from a single plant species for various disorders such as stomach problems, poisonous bites, skin diseases and respiratory complaints (Mahmood *et al.*, 2011). *Prosopis cinerarium* was found to treat the pregnancy. It is recommended that these plants should be used during pregnancy as safeguard against miscarriage. *Prosopis juliflora*, *Portulacaoleracea* and *Phoenix dactylifera* were reported to be effective against skin disease, cough and stomach problem. The local therapists of Kundal and Darra Tang treat the people at huge scale and claim the efficiency of these plants in stomach problem. The study region has very high temperature and hot summer weather; native folks of this region are mostly pretentious by the respiratory tract infections and blood relating diseases. Reported plants which were used in ailment of blood problems and asthmatic diseases are as follows: *Ziziphus jujube*, *Withaniacoagulans*, *Dalbergiasissoo*, *Arundodonax*, *Withaniasomnifera* and *Prosopis cineraria*. There was evidence that frequently utilized mode of preparation was decoction (obtained by boiling), followed by juice, past (dried or fresh material grinding with water), powder, smoke and infusion (plant material soaking at room temperature) (Fig. 6). Our current study on mode of herbal recipes preparation was agree with other studies (Rajakumar & Shivanna, 2009; Rokaya *et al.*, 2010). Therefore, most common mode of administration usually applied orally followed by topical application. Curing skin disease remedies are applied externally, whereas treatment of internal complications contains exclusively oral administration of the remedies. Most of each remedy was applied by a single mode respectively. *Tamarixgallica*, *Ziziphusnummularia*, *Ricinuscommunis* can be used orally, smoke or externally (Table 2). This is in evidence with previous reports in other parts of the world (Kunwar *et al.*, 2006). Oral mode of administration was found the preferred route of application for herbal medicines followed by the topical and drops.

Hence, in order to protect plants native knowledge and their ethnomedicinal uses, there is serious need of more documentation, and identification of vital remedial plants species in the area, advancement of proper cultivation, and best harvesting techniques. Furthermore, exploration of more medicinal plants pharmaceutically needs to be highlighted by conducting awareness programs in the Darra Tang (LakkiMarwat, Khyber Pakhtunkhwa), kundal (Mianwali, Punjab), Pakistan.

**Future influence of the present study:** This investigation will provide a sense and importance for conserving the local flora and medicinal plant among

the resident. It will also help to protect decline and rare species and biodiversity in the study area by the assistances of the indigenous community. Moreover, it can open new gates for pharmaceutical companies, to exploit these medicinal plants for the wellbeing of human in more low-cost and traditional way. This study might be beneficiary for other institutes such as food and cosmetic industry and veterinary department that can use the local medicinal flora for their relevant purposes which will affect the socioeconomic conditions of the local community.

## Conclusion

The present paper represents the first ethnomedicinal study lies between the two provinces border, Khyber Pakhtunkhwa and Punjab, Pakistan and provides significant evidence on medicinal plant utilized among the tribal folks of Darra Tang, LakkiMarwat, Kundal and Mianwali. Traditional herbal recipes possess an advantage for local healers and community older people. Present study exposes, this vast treasure of medicinal plant played a key role in the health maintenance of local residents which might help to preserve the traditional knowledge about the uses of botanical taxa and appeal coming generations towards indigenous remedial practices. Existing study carefully summarizes the data on 94 medicinal species belonging to 40 families. Among the plant collected species Poaceae, Amaranthaceae, Asteraceae and Solanaceae were the most commonly described botanical families. The most frequently used plants were *Rhazystricta*, *Phoenix dactylifera*, *Trianthemaportulacastrum*, *Portulacaoleracea*, *Plantagoovata*, *Chrozophoraoblongifolia* and *Citrulluscolocynthis*. Indigenous people most frequently used leaves of the plants for medication. The greatest amounts of species were used to treat gastrointestinal, inflammatory, renal and urological, and dermatological ailments whereas for diabetes the ratio was the lowest. So our study enhances the opportunities for local applicant to choose medicinal species that are highly significant for pharmacological and phytochemical evaluates for future succeeding works and a number of medicinal plant used for treating of numerous diseases are invited to be considered for further phytochemical and pharmacological screening.

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