EXPLORATION OF MEDICINAL PHYTO-DIVERSITY OF THE SEMI-ARID AREA IN PUNJAB PROVINCE, PAKISTAN

M. A. Akram[1, 2*], N. Iqbal[2], M. Aqeel[1], N. Khalid[3], S. Alamri[4, 5], M. Hashem[4, 6], M. Abrar[1], A. Manan[1], W. Islam[7] and A. Noman[2*]

[1] School of Life Sciences, Lanzhou University, Lanzhou, Gansu Province, PR China
[2] Department of Botany, Government College University, Faisalabad, Punjab, Pakistan [3] Department of Botany, Government College Women University, Sialkot, Pakistan
[4] King Khalid University, College of Science, Department of Biology, Abha 61413, Saudi Arabia
[5] Prince Sultan Ben Abdulaziz Center for Environmental and Tourism Research and Studies, King Khalid University, Abha, Saudi Arabia
[6] Assiut University, Faculty of Science, Botany Department, Assiut, 71516, Egypt
[7] College of geography, Fujian Normal University, Fuzhou, China
*Corresponding Author's Email: alinoman@gcuf.edu.pk; ynmadnan@gmail.com

Abbreviations:-

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FC:	The number of informants mentioning uses of a plant species
FL:	Fidelity Level
GIP:	Gastro-intestinal & intestinal parasites
ICF:	Informant Consensus Factor
IK:	Indigenous Knowledge
IP:	Indigenous Plants
JI:	Jaccard Index
N_t:	The number of taxa or species used to cure that disease category
N_{ur}:	The total number of use report for each disease category
RFC:	Relative Frequency Citation
ROP:	Rank Order Priority
RPL:	Relative Popularity Level
UV:	Use Value

ABSTRACT

This is the first ethno-botanical study about the indigenous plants of district Faisalabad, Punjab-Pakistan. Main theme behind this study documents the existing ethno-medicinal data about local traditional herbal treatments. Overall, 300 local informants were interviewed from 22different locations of the district and collected data was analyzed by using different quantitative ethnobotanical tools. The 61 plants of 53 genera and 29 families be there found in use for 15 disease caused by microorganisms and contagious ones also. With reference to highest Use Value (UV), *Ficus carica* (0.83), *Albizzia lebbeck* (0.73) and *Psidium guajava* (0.71) were found the most used medicinal plant species in area. The 100% Fidelity Level (FL) was calculated for *Acacia nilotica* being used against gastro, respiratory, diabetics and hypertension. The highest Relative Frequency Citation (RFC) value was calculated for *Citrus aurantifolia*. The maximum Informant Consensus Factor (ICF) index was calculated for gastro and respiratory problems, fever, headache, and skin infection. The comparative study by calculating Jaccard Index (JI) with reported literature was shown that 8.18%resemblance and 12.81% distinction to earlier studies; however 79.01% medicinal uses of the reported species were documented the first time. The plants reported with high RPL index can be further analyzed for biochemical pharmaceutical and biotechnological screening.

Keywords: Biochemical, Diseases, Ethnobotanical study, Jaccard Index, Popular.

Graphical Abstract
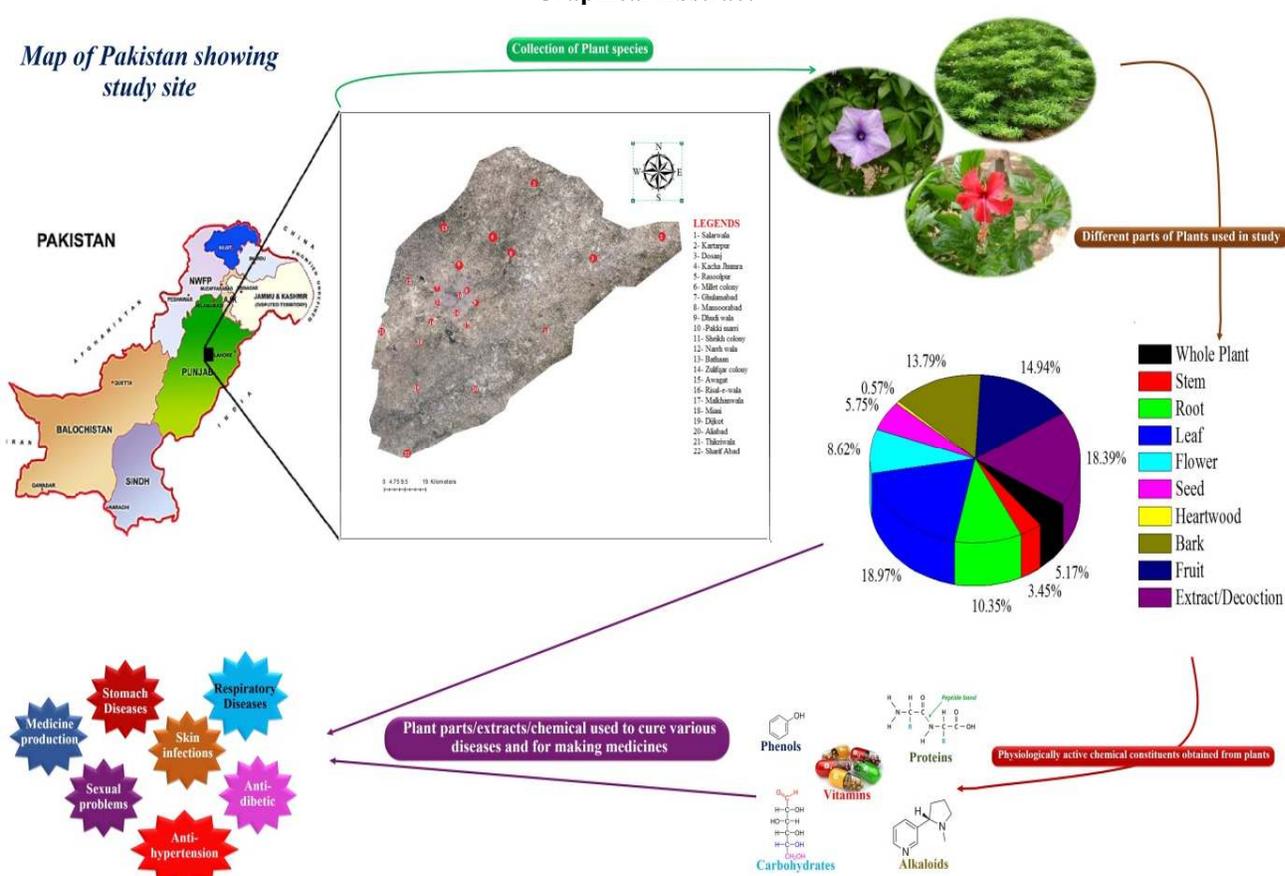
INTRODUCTION

The exclusive use of medicinal plants recipes and products by the people with faith to cure different diseases showed their reliance on medicinal plants (Islam *et al.,* 2017; Shinwari and Qaiser 2011). Achievement of any curative system depends on the accessibility of suitable drugs on a sustainable source (Akram, 2020). Medicinal plants generally found in massive quantity particularly in the tropics, work on such plants prolong to concern researchers all over the world (Arulmozhi *et al.,* 2007; Aqeel *et al.,* 2019). The key goal of ethno pharmacological research be about to trace indigenous knowledge about plants and with profitable outcomes (Leporatti and Lattanzi 1994; Shinwari and Khan 2000). More than 80% of the populace in the third world countries depends merely on the therapeutic plants for conventional remedy. Natural remedies are cheaper and often the only medicines exist in distant countryside areas. Pakistan is gifted with amazing variety of natural flora with medicinal properties owing to varied climatic conditions (Shinwari 2010; Ali *et al.,* 2016). Almost, 1500 plants which have suitable curative features stated in Pakistan. Eighty-four percent of populations prefer

conventional medicines for their therapeutic desires (Hocking 1958). Presently, many synthetic medicines are also contrived by consuming biological constituent's resultant from medicinal flora. Ethno-botanical studies on the curative usages of plants by the natives are frequently notable; as an outcome, they offer new medicines from the herbal source (Noman *et al.,* 2013; Amjad *et al.,* 2017). Above 21,000 plants have been recorded for their medicinal uses in the world (Sarwat and Ahmad 2012). Approximately 20% out of the total plants present in the world are consumed for therapeutic treatments in humans (Khan *et al.*, 2015; Hussain *et al.*, 2012). The use of curative plants in customary health system changed the devotion and direction of scientists to ethno-botanical studies.

The district Faisalabad's soil is fertile, possessing a variety of plants with enormous healing properties. But phyto-diversity of this district remained unexplored. Keeping in view all these facts, the current study was planned to file the local therapeutic plants and indigenous data of this area to assess curative plants handed down by native community of district Faisalabad. We documented the local medicinal data about traditional herbal treatments for different diseases, including plant fragment(s) consumed and their application methods,

way of grounding by using different ethno-botanical indices. Therefore, we have confidence that current study will act as glimmer of hope and aid to protect threatened plant species and as well as play probably noteworthy role to find the novel medicines.

MATERIALS AND METHODS

Description of study area: The current research was conducted in Faisalabad and it is the second largest district of province Punjab-Pakistan. District Faisalabad has an area of about 5,856 km^2 (2,261 mi^2).. Geographically, it is situated between 73˚ to 74˚ east longitudes and 30˚ to 31.5˚ north latitude, at 605 feet (at 180 meters) above the sea level. Faisalabad has semi-arid climate and weather of Faisalabad is intense with very slight rain fall and average annual rainfall is almost 375 millimeters (14.8 inch). The temperature range is 50˚C in summer season (in month of June-July) to 04˚C in winter season (in month of January-February). The river Chenab meets almost 80% of water requirements of the cultivated land.

Ethno-botanical survey, data collection, plants identification and preservation: We collected and document the indigenous knowledge (IK) and medicinal uses of local flora of district Faisalabad. The data was collected from 22 different sites of district (Figure 1). The fieldwork was based on frequent field tours, observations, (Malla *et al.,* 2015) and individual interviews of 300 informants based on standard method and guidelines (Ishtiaq *et al.,* 2012; Martin 2010; Chan *et al.,* 2012).The ideal opportunity for field visits was chosen as per the existence cycle of the plants and their period of blossoming. The gathering, preparing and usage of the plant items by the neighborhood network were likewise remembered. The plants species were collected on various field visits from the investigation territory deliberately. The diverse accessible plant parts were collected like branches, bark, blooms, seeds and natural products and in addition conceivable.

    All the 61 plants samples were collected with the assistance of local peoples during flowering stage pressed and preserved. Mostly information was documented during the field tours comprised informants bio data, local name(s) of used species, different parts of used plant, plant sources, preparation and administration measures, health disorders treated and others. The local herbalists (Hakims)/traditional healers and drug-sellers were also accessed for ratification of plants and their local medicinal uses. The photographs of reported plant species were caught with their blooms, leafy foods and in addition conceivable to confirm the identification (Figure 2).

    Additional confirmation and consistency of collected information, plants scientific names and grouping were reconfirmed with the assistance of herbaria correlation, accessible ordered writing, Flora of West Pakistan, Flora of Punjab and Flora of Pakistan (Hocking, 1958). The gathered species were further dehydrated and safeguarded. Emphatically, the reported plants herbarium was preserved and plant sample slips were submitted in Department of Botany, Government College University Faisalabad. For further authentication of botanical names the international sites were used (www.theplantlist.org, and http://www.ars-grin.gov/cgi-bin/npgs/html/queries.pl). The local and scientific names of reported plant species and their ethno-medicinal usages were documented cautiously.

Quantitative analysis of collected data by using Ethnobotanical Indices: The collected and recorded data were expressed in MS excel sheets in the form of matrix citing botanical names of reported plant species, local names, locality of collection, family name, plant parts used, chemical constituents and ethno-medicinal uses (Table 1, 5). The ethnobotanical data was collected, calculated, integrated and analyzed as described and recommended (Verpoorte, 2002). The validity of data was checked by computing different ethnobotanical indices. The values of reported data were given in proportions and percentages.

Informants consensus factor (ICF): The informant consensus factor (ICF) value was ranged from 0 to 1 and ICF index was computed by utilizing the equation (Bhat *et al.,* 2014; Heinrich *et al.,* 1998)

$$FIC = N_{ur} - N_t / (N_{ur} - 1) \ldots\ldots\ldots\ldots (Equation\ 1)$$

Where, "N_{ur}" the aggregate number of utilization report for every disease class, "N_t" the quantity of taxa or species utilized to cure particular disease class and "1" shows highest level of informant consensus.

Use value (UV): Use value, a technique that concludes the relative significance on plant uses, was also ascertained by utilizing the accompanying equation as described earlier (Phillips and Gentry 1993; Šavikin *et al.,* 2013),

$$UV = \sum U_i / N \ldots\ldots\ldots\ldots (Equation\ 2)$$

Where, "U" demonstrates the quantity of usages referred by informants for that plant species and "N" eludes the aggregate number of local witnesses/sources. High value of UV denotes that numerous use reports for that species and low value denotes less use reports stated by informants.

Relative Frequency of Citation (RFC): It was computed to assess the indigenous importance of a plant in study area. RFC was determined by utilizing the accompanying recipe as depicted earlier (Vitalini *et al.,* 2013),

$$RFC = FC/N \quad (0 < RFC < 1) \ldots\ldots\ldots\ldots (Equation\ 3)$$

Where, "FC" is the quantity of witnesses specifying utilize of a plant and "N" is the aggregate number of witnesses/sources participating in survey.

Fidelity level (FL): It is calculated by using following formula as described previously (Alexiades and Sheldon 1996),

$$FL\ (\%) = (N_p / N) \times 100 \ldots\ldots\ldots\ldots \text{(Equation 4)}$$

Where, "Np" the quantity of witnesses who cited the utilization of specific plant for a specific ailment and "N" aggregate number of sources citing to that species for a disease.

Relative popularity level (RPL): Briefly, an adjustment scale was presented, in which whole experienced plants were partitioned as "popular" and "unpopular". For popular plant species, RPL was self-assertively chosen by using rational approach as to 1.0 and "1" express the popularity of a plant species for main disease or disease category, while "0" express that no any disease or disease category cured by a plant. For unpopular plants, the RPL is under 1.0. RPL esteems might be ascertained for every particular species as per its location on graph. RPL was computed for singular species from the correlation between the quantity of witnesses who cited to a specific species and the normal number of usages individual species (Friedman _et al.,_ 1986)**.**

Jaccard Index (JI): The JI is utilized to contrast the present ethnobotanical research information and earlier published medicinal plants data in different regions of Pakistan and also with different nation-states of the world. The JI was figured by utilizing the recipe portrayed previously (González-Tejero _et al.,_ 2008),

$$JI \quad = c \times \quad \frac{100}{a+b-c} \qquad \text{(Equation 5)}$$

Where, "a" is reported quantity of plants of the present investigation territory, "b" is earlier published number of plants in other different areas and "c" for common quantity of plants in the two zones.

Rank order priority (ROP): ROP is a correction factor that used to give the proper positioning of plants using diverse values of FL and RPL. ROP is evaluated by formula as elucidated previously (Friedman _et al.,_ 1986)

$$ROP = FL \times RPL \ldots \text{(Equation 6)}$$

RESULTS AND DISCUSSION

Faisalabad city possess a variety of plants, having massive therapeutic value. In current research work we focused on point by point ethno-medicinal and photographic portrayal of collective plants. Total 61 plants belonging to 53 genera and 29 families were gathered and recognized (Table 1, 5). The observed plant types include trees, shrubs and herbs. Chief plant habit was tree (Table 1). It discloses from collected floral data that majority of the plant species belongs to Moraceae family (Figure 4). A part of local population cannot afford modern medicines due to high price. Therefore, plants are extensively used by them for treatment of the sicknesses. Different parts of plants such as leaf, root and seed and so on are used to treat multiple diseases and health disorders. The plants at some point indicate variety in their stuffs (for the most part constituents) with the difference in environmental conditions.

Gender based use of indigenous knowledge (IK), age and occupation: Mostly the males have more IK and are familiar about the use of medicinal plants. Males also graduated as herbalists (Hakims) and practiced as traditional healer or Hakim while there is lesser trend of females to learn formal education as herbalists. Females have commonly learned IK from their parents through daily life observations. Majority of individuals acknowledged to have applicable IK and were practicing as herbalists (Hakims) were above 50 years. Moreover, the socio-demographic data of informants are shown in Table 2 and literacy data in Table 3, respectively.

Species diversity, consumptions and its application: This study highlighted versatile uses of 61 species belong to 29 families to treat and cure human diseases. We studied and noted the typical usages of local wild type indigenous plant species. Basic information about indigenous plants (IP) was set systematically by family and species name, curative practices and chemical constituents (Table 5).

Results reveal that collected indigenous herbs are widely being utilized to treat many ailments by local community of this district. Our findings are in accordance with opinion of earlier workers reported the similar application of herbs, particularly as solution in Faisalabad and adjoining zones (Zereen _et al.,_ 2013). A few plants in Faisalabad district have also been observed in other districts of province. For example, _Mangifera indica, Ficus religiosa, Jasminum sambac_ etc. have been reported in this district and in Hafizabad district (Umair _et al.,_ 2017). It is worth mentioning that the region had meager agriculture conveniences of valuable therapeutic plants and apparently facing risk from over exploitation like grazing and cutting. The public responsiveness about the sustainability and protection of these plant species is crucially significant to control extensive cutting and detrimental practice before many of these turn into non-existent.

Plants parts used and extensively used plant part: Different fragments of therapeutic native flora were utilized as drug by the indigenous community of this district (Figure 3). Amid the dissimilar herbal parts foliage were maximum used to cure the illnesses tracked

by bark, fruit, root, flower, whole plant, stem and heart wood. Our results are in agreement to the results of Panghal *et al.,*(2010) and Noman *et al.,* (2013, 2017) who described that the foliage was frequently utilized to cure diseases. Contrarily, our results are not in consent to the opinion about which had tended that root was the most well-known utilized part for the treatment of different ailments (Cheikhyoussef *et al.,* 2011; Teklehaymanot 2009).

Life form of collected medicinal flora: The life form of reported medicinal plants in district was observed and trees (31 species) were found to dominant plant form followed by shrubs (26 species) as well as herbs (4 species) (Table 1, Figure 5). Most prevailing plant families in district were found with species number as: Moraceae (8), Apocynaceae (5), Euphorbiaceae, Fabaceae, Mimosaceae, Myrtaceae, Verbenaceae (4) and rest of the families which denoted the less number of species are represented in Figure 4.

Informant consensus factor (ICF): ICF index expresses informer's consent on the therapeutic plant utilization, and estimates inconsistency in means of exploitation counter to described illnesses (Table 4). To calculate ICF value, diseases were organized into 15 kinds on the consumption basis. The ICF index, close to 1 depicts that species is very famous and used by a large number of local people of this district because of its authenticity about diseases. However, the value of ICF, close to 0 depicts reduced informers usage of a particular plant to cure described ailments. The maximum 77.05% reported plant species were used for the diseases related to gastro-intestinal & intestinal parasites (GIP), followed by respiratory problems, fever/headache, skin infection, cuts/wounds healing, muscular-skeletal problems/rheumatism, sexual problems, weakness or dizziness, neurologic diseases, infection as well as inflammation, anti-diabetic, cardiovascular problems, kidney problems, snake bite/scorpion bite and anti-hypertensive (63.93, 39.34, 27.87, 24.59, 22.95, 21.31, 19.67, 18.03, 16.39, 11.48, 9.84, 8.20, 6.56 and 6.56% respectively). These findings figure out gastro-intestinal & intestinal parasites (GIP) and respiratory problems dominant in the district. Our results are in agreement with records related to gastro-intestinal & intestinal parasites (GIP) and respiratory problems reported by some earlier researchers (Noman *et al.,* 2017; Revathi *et al.,* 2013; Umair *et al.,* 2017). However, Benarba (Benarba 2016) and Abdelhalim *et al.,* (Abdelhalim *et al.,* 2017) reported more and different plants to cure gastro-intestinal &intestinal parasites (GIP) and respiratory problems. The ICF value for different 15 ailment categories was found that showed highest consensus (0.43) of plants for gastro-intestinal & intestinal parasites while least consensus (0.19) was found for muscular-skeletal problems/rheumatism. The results regarding average ICF

value 0.30 is not in agreement with the previous research work accomplished in Pakistan (Bibi *et al.,* 2014; Umair *et al.,* 2017).

Use value (UV) and Relative frequency of citation (RFC): The RFC value substantiates the citation frequency of a therapeutic plant utilized to cure many ailments. The RFC value of reported plants ranged between 2 to 17% (Table 1). The uppermost RFC index was computed for *Citrus aurantifolia* (0.17) and lowest value (0.02) was calculated for *Euphorbia royleana, Callistemon viminalis, and Psidium guajava*. The said species were described by maximum local informers, hence showing high RFC. The RFC index helps to sort out the potentially reported plants species for further phytochemical analysis, pharmacological analysis and also use as reference in drug development.

The reported value of UV ranged from 0.07-0.83 shows low to high quantity of usage stated by the local informers for a specific reported plant species. The highest UV was found for *Ficus carica* (0.83), *Albizzia lebbeck* (0.73) and *Psidium guajava* (0.71) and lowest for *Ficus benjamine* with UV of 0.07 (Table 1). This UV index shows extensive use of species having high UV and less accessibility and medicinal uses of species having low UV. The plant species with high UV can be recommended for further evaluation of their phytochemical and pharmacological analyses to ensure the presence of bioactive compounds (Ahmad *et al.,* 2016). However, the UV index cannot exactly differentiate that a plant was utilized for a particular or several diseases (Musa *et al.,* 2011). The UV index also related with various issues e.g., maintenance and conservation of plants having maximum UV index (Albuquerque *et al.,* 2006). The plant species like *Ficus carica*, *Albizzia lebbeck* and *Psidium guajava* are most probable to suffer the highest cutting, picking and harvesting threat. The most important plants can be sorted out and distinguished through such research based studies to maintain and guarantee their use in the society.

Ficus carica is also widely used to cure inflammation, cancer (Mawa *et al.,* 2013), gastric problems, urinary tract infection, respiratory, endocrine and for reproductive disorders (Badgujar *et al.,* 2014). Mishra *et al.,* (Mishra *et al.,* 2010), reported that *Albizzia lebbeck* bark have anti-asthmatic, anti-anaphylactic properties and pods have analgesic, anxiolytic, anti-inflammatory, anti-diarrheal activities and antispermatogenic effect (Farag *et al.,* 2013; Sheyin *et al.,* 2015). The *Psidium guajava* broadly studied for anti-microbial (Mendez *et al.,* 2016), against diabetes (Joseph *et al.,* 2016), anti-inflammatory (El-Ahmady *et al.,* 2013), anti-tumor, anti-cancer (Ashraf *et al.,* 2016), for diabetes, vomiting, diarrhea and dyslipidemias (Elias *et al.,* 2017) and leaves aqueous extracts of *Psidium guajava* use for obesity and dyslipidemias (Simao *et al.,* 2017). These

outcomes ratify high UV and RFC index of above stated medicinal plants in district Faisalabad.

Fidelity level (FL): The FL of plants was calculated that started from 22.22 and ended at 100% (Table 6). The high %age of fidelity level (FL) of a plant species shows the dominance of a particular health disorder in a locality and the exploitation of plant species by the peoples to cure it (Bibi *et al.,* 2014; Malla *et al.,* 2015). The 100% FL was calculated in *Acacia nilotica* for gastric, respiratory, diabetics and hypertensive diseases. 85.71, 80.95, 78.38, and 73.08% FL was found for *Salvadora oleoides, Ficus religiosa, Calotropis procera* and *Lawsonia inermis* against respiratory diseases, sexual disorders, rheumatism and anti-inflammatory, respectively.

Ali *et al.,* 2012 evaluated anti-cancer, anti-platelet aggregator, anti-pyretic properties of *Acacia nilotica* a reported plant species showed 100% FL (Ali *et al.,* 2012) while (Farzana and Tharique 2014) reported *Acacia nilotica* for the treatment of bleeding diseases, prolapse and leucorrhoea.

Relative popularity level (RPL): The 300 local informants mentioned 61 plants species for medicinal use against 15 different categories of diseases. The 21 species (out of 61) got more consideration by informants, so proceed for further analysis and calculations. A plant species referred by 17 or further local informers measured as popular while below 17 was considered as unpopular plant species. The high RPL value of these species shows their worth, efficacy and the IK of local community about their medicinal use. Therefore, according to this criterion it was found that 9 plants cited by 17 informers or further were categorized for popular and 12 plants were mentioned very few to 16 informers were classified unpopular. *Salvadora oleoides* (Salvadoraceae)*, Ficus religiosa* (Moraceae)*, Calotropis procera* (Asclepiadaceae)*, Acacia nilotica* (Mimosaceae)*, Lawsonia inermis* (Lythraceae)*, Psidium guajava* (Myrtaceae)*, Nerium oleander* (Apocynaceae)*, Melia azedarach* (Meliaceae) *and Rosa indica* (Rosaceae) were found the popular species in this district with 1.0 RPL value (Table 6). This is the earliest reference line study about IK of native community on the subject of utilization of these popular local indigenous plants (IP) species for specific diseases. The results of this study are in line with earlier studies about the eminence of ethno-medicinal plant species amid Bedouins of the desert (Friedman *et al.,* 1986) and ethno-botanical studies of medicinal plants in Palestinian area. *Alhagi maurorum* and *Tamarix aphylla* were classified as unpopular species in above discussed studies because of their low RPL value.

Rank order priority (ROP): The ROP values were utilized to allocate an appropriate rank to plants having diverse fidelity levels. These RPL values were used as correction factor for the adjustment and settlement of FL. The RPL values of 21 most important reported plant species has been shown in Table 6. The ROP value above 50 only found for 9 plant species (Table 6). It is perhaps due to lack of awareness about indigenous knowledge (IK) or less popularity of traditional medicines among the peoples of this district. *Acacia nilotica* was extensively used plant species because of its ROP value was found 100 while the plant species *Salvadora oleoides, Ficus religiosa, Calotropis procera, Lawsonia inermis, Psidium guajava, Nerium oleander, Melia azedarach and Rosa indica* were found with notable ROP values (86, 81, 78, 73, 69, 63, 58 and 53 respectively). The ROP indexes reported by (Friedman *et al.,* 1986; Umair *et al.,* 2017) were comparable to the results and findings of the present study.

Jaccard index (JI): An evaluation of reported data by ethno-botanists from the different areas of Pakistan as well as other neighboring and international countries was executed by using the formula and method of Jaccard Index (JI). The original application data of 61 ethno-medicinal plant species in our present study was associated with 20 former ethno-botanical studies conducted and published from different areas of Pakistan and China Bangladesh, Namibia, Tanzania, Ethiopia, Algerian Sahara, Iraq, Iran, Afghanistan, India (Table 7). The highest JI value was calculated 18.75, tracked by 14.96 and lowest JI value was found 0.50, tracked by 0.81. The present study data of 61 plant species of district Faisalabad showed similarity index of the compared information sorts from 20.75 to 0.71 and the deviation fraction ranges from 47.17 to 1.42. The three highest values of similarity index was documented from Pakistan with the ethnobotanical studies of (Hussain *et al.,* 2012), followed by (Umair *et al.,* 2017) and (Qasim *et al.,* 2014) with JI value 20.75, 20.00 and 16.67 respectively (Table 7) and the lowest was documented from the studies of (Alam *et al.,* 2011) with JI value 0.71. The maximum level of similarity index was establish with the work of (Hussain *et al.,* 2012), that shown some cultural, ethnic, environmental, geographical and vegetation similarity between Faisalabad and Mirpurkhas. While, the minimum level of similarity index was establish with work of (Alam *et al.,* 2011) in Buner-Pakistan, it might be due to some ecological barriers and difference in indigenous knowledge (IK) that bring out geographical isolation of plant species and assortments in habitats and vegetation. Whereas, among countries the maximum similarity value was documented from Tanzania having JI value 16.13 and the lowest values of similarity index was found from China with JI value 1.16. Normally, traditional herbal practitioners shared indigenous knowledge (IK) with their own decedents and generations. The indigenous knowledge (IK) varies from one

community to another due to social and cultural practices. It also differs with gender, age, origin and literacy level of persons cited indigenous knowledge (IK). This type of comparative ethnobotanical studies is very helpful to explore the important indigenous knowledge (IK) or information among communities of different regions and countries lead to find the new remedies for diseases.

Innovation and future influence: The current ethno-botanical study is first document to explore the indigenous knowledge (IK), uses and medicinal properties of 61 medicinal plant species in district Faisalabad utilized by the native community. The comparison of reported species with earlier studies related to medicinal plants described in various regions of Pakistan and in other neighboring countries as presented in the Table 7 to trace out the novelty innovation index. Almost, 8.18% therapeutic utilization of stated plants was identical, while 12.81% were distinct to earlier studies. However, 79.01% medicinal uses of reported plant species were innovative in the current study.

Additionally, medicinal usages of plants described in different zones of Pakistan e.g. from Mirpurkhas Sindh Province of Pakistan displayed maximum similarity index with JI value 20.75 as compared to other areas of Pakistan. The collected ethno-botanical data from the district Faisalabad expose remarkable difference with regard to use of plant parts, method of verdant preparation and their consummation as published and stated from different areas of Pakistan and other countries.

Few of the newly reported and documented therapeutic uses and pertinent plants cited, consist of: *Acacia nilotica* (pneumonia), *Albizzia lebbeck* (leprosy), *Alstonia scholaris* (malaria), *Calotropis procera* (tuberculosis)**,** *Carissa carandas* (anti-hypertensive), *Dalbergia sissoo* (leucoderma), *Eucalyptus camaldulensis* (dizziness), *Ficus carica* (kidney or bladder stone), *Ficus religiosa* (carbuncle), *Mangifera indica* (scabies), *Melia azedarach* (fever & headache), *Nerium oleander* (cardiovascular diseases), *Psidium guajava* (cuts & wounds healing), *Punica granatum* (jaundice), *Ricinus communis* (galactagogue), *Rosa indica* (semen secretion), *Salvadora oleoides* (snake biting/scorpion biting), *Thevitia peruviana* (rheumatism) and *Zizyphus mauritiana* (paralysis). The plants reported with new restorative, medicinal usages and high estimation of RPL could be contemplated advance for phytochemical analysis, to screen out the bioactive mixes and compounds, pharmacological analysis and also use as reference in drug development and to introduce novel drugs.

Table 1. Presentation of plant parts used, life form, RFC value, UV value along with their distribution across the district Faisalabad.

Name of Species	Common Name	Location	Habit	RFC	UV	WP	ST	RT	L	FL	SE	HW	B	FR	ED
Acacia nilotica L.	Daisikikar	Gulfishan colony		0.07	0.48			RT	L		SE		B		ED
AlbizzialebbeckBenth.	Shareen	Ayub colony		0.04	0.73	WP									
Alstonia scholaris R. Br.	Dita bark, Devil's tree	Sheikh colony		0.13	0.30								B		ED
Azadirachta indica A. Juss.	Nimb, Neem	Gulfishan colony		0.09	0.21	WP									
Bombaxceiba Linn.	Simbal	Gulfishan colony		0.03	0.33				L				B	FR	ED
Bougainvillea spectabilisWilld.	Gate bale,Bougain bale	Ghulamabad		0.06	0.29										ED
Callistemon viminalis G. Don.	Bottlebrush	Samanabad		0.02	0.20				L						
Calotropis procera (Ait) R. Br.	Ak, Safaidak	Ghulamabad		0.08	0.50	WP									
Capparisaphylla Roth.	Delha	Millet colony		0.03	0.33			RT		FL				FR	ED
Carissa carandasAuct.	Karanda	Ayub colony		0.04	0.45			RT	L					FR	
Cestrum nocturnum L.	Raatki rani	Risal-e-Wala		0.10	0.17	WP									
Citrus aurantifoliaSwingle.	Khagzilimun	Gulfishan colony		0.17	0.22									FR	
Cordiamyxa Linn.	Lasoorha	Ghulamabad		0.03	0.60									FR	ED
DalbergiasissooRoxb. ex DC.	Tahli, Shisham	Gulfishan colony		0.11	0.39				L			HW	B		
Durantarepens Linn.	Duranta	Samanabad		0.04	0.17									FR	
Eucalyptus camaldulensisDehnh.	Safaida	Sheikh colony		0.07	0.52				L						
Eugenia jambolana Lam.	Jaman	Samanabad		0.09	0.22				L		SE		B	FR	ED
Euphorbia royleanaBoiss.	Churee	Sheikh colony		0.02	0.67										
Ficusbengalensis Linn.	Bargad	Dhudi wala		0.05	0.47	WP									
Ficus benjamine Linn.	Putrajanvi	Ayub colony		0.12	0.07			RT					B		ED
Ficus carica Linn.	Anjir	Ghulamabad		0.04	0.83									FR	ED
Ficus elastic Linn.	Rubber tree	Narrh wala		0.06	0.33				L				B		
FicusinfectoriaRoxb.	Pilkhan	Pakki marri		0.07	0.29										
FicusmacrophyllaDesf. ex Pers.	Bayfig	Ayub colony		0.10	0.17								B	FR	
Ficus religiosa Linn.	Bodhi, Peepal	Ghulamabad		0.04	0.67		ST		L		SE		B	FR	
Gmelinaphilippensis Linn.	Badhara	Samanabad		0.02	0.17		ST								
Hibiscus rosa-sinensis Linn.	Shoe flower	Gulfishan colony		0.13	0.18				L	FL					ED
Ipomoea cairica Sweet.	Messina	Sheikh colony		0.04	0.36	WP									
Ipomoea carneaJacq.	Besharmibooti	Sheikh colony		0.07	0.29										
JasminumsambacAit.	Motiaa, Jasmine	Sheikh colony		0.09	0.30			RT	L	FL					ED
JatrophaintegerrimaJacq.	Jatropha	Ghulamabad		0.03	0.44	WP									

Botanical name	Common name	Locality	Habit	RFC	UV
Lantana camara L.	Lantana	Risal-e-wala	Shrub	0.04	0.25
Lawsonia inermis Linn.	Mehndi, Henna	Ayub colony	Tree	0.14	0.24
Leucaenaleucocephala(Lam.) De Wit.	Ipleiple	Tariqabad	Tree	0.05	0.20
Leucophyllumcandidum L.	Silver cloud	Mansoorabad	Shrub	0.03	0.22
Mangifera indica Linn.	Aam	Ghulamabad	Tree	0.06	0.39
Melia azedarach Linn.	Bakyan	Millet colony	Tree	0.13	0.33
Moringaoleifera Lam.	Sonjana	Mansoorabad	Tree	0.03	0.56
Morus alba Linn.	Toot	Sheikh colony	Tree	0.07	0.25
Morusnigra Linn.	Tootsiyah	Gulfishan colony	Tree	0.04	0.42
Murrayapaniculata(Linn.) Jack.	Kamini	Samanabad	Tree	0.10	0.57
Nerium oleander Linn.	Knair	Ayub colony	Shrub	0.06	0.29
Parkinsonia aculeate L.	Parkinsonia	Sheikh colony	Shrub	0.05	0.46
Phoenix dactylifera Linn.	Khajur	Ghulamabad	Tree	0.04	0.27
Pithecellobiumdulce(Roxb.) Benth.	Jang jlaibi	Ghulamabad	Tree	0.04	0.38
Pongamiapinnata(Linn.) Merr.	Sukhchan	Samanabad	Tree	0.08	0.21
Prosopisglandulosa Torr.	Paharrikikar	Ayub colony	Shrub	0.11	0.24
Prunuspercica Batsch.	Aru	Premium mill colony	Tree	0.10	0.20
Psidium guajava Linn.	Amrud	Sheikh colony	Shrub	0.02	0.71
Punica granatum Linn.	Anar	People's colony	Shrub	0.06	0.35
Quisqualisindica Linn.	Barmasi	Ayub colony	Herb	0.04	0.50
Ricinus communis Linn.	Arand	Dhudi wala	Shrub	0.07	0.35
Rosa indica Linn.	Ghulab	Ayub colony	Shrub	0.03	0.63
Salvadoraoleoides Decne.	Vann	Ayub colony	Tree	0.04	0.45
Schinusterbinthifolus Raddi.	Brazillianpepper	Ghulamabad	Shrub	0.13	0.15
Tabernaemontanadivaricata(L.) R. Br. Ex Roem. &Schult.	Chandni	Sheikh colony	Shrub	0.06	0.33
Tamarix aphylla Karst.	Lal-jhav, Rakta-jhav	Ayub colony	Tree	0.08	0.25
Thevitia peruviana Pers.	Thivati	Gulfishan colony	Shrub	0.05	0.43
Vitex trifoliate L.	Pani-ki-sanbhalu	Ghulamabad	Shrub	0.11	0.22
Withaniasominifera Dunal.	Ashwaganda, Panir	Zulifqar colony	Shrub	0.03	0.44
Zizyphusmauritiana Lamk.	Ber	Dhudi wala	Tree	0.04	0.42

WP: Whole Plant; **ST:** Stem; **RT:** Root; **L:** Leaf; **FL:** Flower; **SE:** Seed; **HW:** Heart Wood; **B:** Bark; **FR:** Fruit; **ED:** Extract and Decoction

Plant habit: Tree, Shrub, Herb; **RFC:** Relative frequency citation; **UV:** Use value

Table 2. Age range and gender ratio of informants from District Faisalabad.

Category No.	Age Range	Gender		No. of persons	Percentage (%)
		Male	**Female**		
Herbalist/Hakims	Above 50	7	1	8	2.67
Youth	21-30	28	2	30	10.00
Adult	31-40	39	16	55	18.33
Middle age	41-50	67	32	99	33.00
Senior	51-60	43	27	70	23.33
Old	61-70	21	5	26	8.67
Very old	Above 70	9	3	12	4.00
	Total	**214**	**86**	**300**	

Table 3. Educational ability of informants from District Faisalabad.

Education level	No. of individuals	Percentage (%)
Illiterate	113	37.67
Primary	57	19.00
Middle	73	24.33
Secondary	39	13.00
University	18	6.00
Total	**300**	

Table 4. Informant consensus factor (*ICF) of reported plant species against different disease categories.

Disease Categories	Plant reported	Use Reports (Nur)	%age of use reports	%age of taxa	ICF
Gastro-intestinal & Intestinal parasites	47	82	20.61	77.05	0.43
Fever and headache	24	38	10.53	39.34	0.38
Muscular-skeletal problems/Rheumatism	14	17	6.14	22.95	0.19
Weakness and dizziness	12	19	5.26	19.67	0.39
Cuts and wounds Healing	15	21	6.58	24.59	0.30
Respiratory problems	39	51	17.11	63.93	0.24
Snake bite/Scorpion bite	4	6	1.75	6.56	0.40
Cardiovascular problems	6	9	2.63	9.84	0.38
Sexual problem	13	17	5.70	21.31	0.25
Neurologic diseases	11	14	4.82	18.03	0.23
Skin infection	17	22	7.46	27.87	0.24
Infection and Inflammation	10	15	4.39	16.39	0.36
Anti-diabetic	7	9	3.07	11.48	0.25

| Anti-hypertensive | 4 | 5 | 1.75 | 6.56 | 0.25 |
| Kidney problems | 5 | 7 | 2.19 | 8.20 | 0.33 |

Table 5. Medicinal uses and physiologically active chemical constituentsof reported plant species in district Faisalabad.

Family Name	Plant/Species Name	Physiologically active chemical constituents	Conventional medicinal use
Anacardiaceae	*Mangifera indica Linn.*	Flavonoids, phenolic compounds, glucose, galactose, xylose, rhamnose, tannin, mangiferin, friedelin, b-sitosterol, vitamins A, C and D (Joshi, 2003)	Leucorrhoea, laxative, diarrhoea, dysentry, respiratory problems, sexual problems, cuts and wounds, kidney problems
	Schinus terbinthifolus Raddi.	Catechin, tannins, terpenes, flavonoids, saponins (de Carvalho *et al.,* 2003).	Anti-inflammatory, cuts and wounds
	Alstonia scholaris R. Br.	Ditamine, echitamine, echitenine, echicaoutchin, echicerin, echitin (Khan *et al.,* 2015)	Cardio tonic, anti-diabetic, fever, abdominal disorders, skin diseases, asthma, bronchitis
	Carissa carandas Auct.	Isoamyl alcohol, isobutanol, beta-caryophyllene (Farag *et al.,* 2013)	Intermittent fever, diarrhea, oral inflammation, blood pressure, respiratory diseases
Apocynaceae	*Nerium oleander Linn.*	Nerin, oleandrin, folinerin, neritaloside, urechitoxin, adynerin, B-sitosterol, ursolic, oleanolic acids, neriaside, oleosides A,B,C,D,E and F (Joshi, 2003)	Healing of wounds, cardio-tonic, indigestion, itching, sexual diseases
	Thevitia peruviana Pers.	Bornesitol, theveside, viridoside, thevefolin, epiperuviol acetate, α-β-amyrin, thevetin, thevetoxin, peruvoside	Kidney problems, cardio tonic, purgative, fevers, rheumatism, cuts and wounds
	Tabernaemontana divaricata (L.) R. Br. Ex Roem. &Schult.	Tabernaemontanine, arteriosclerosis, apparicine, catharanthine, coronaridine, voacamine, coronaridine, voacamine, voacangine, voacristine, vobasine (Farag *et al.,* 2013)	Dysentery, diarrhea
Arecaceae	*Phoenix dactylifera Linn.*	Vitamin A, B and D, galactose, xylose, rhamnose, uronic acid (Joshi, 2003)	Respiratory problems, tonic, laxative, diarrhea
Asclepiadaceae	*Calotropis procera (Ait) R. Br.*	Calotropin, calotropangenin, usharin, calotoxin, calactin (Joshi, 2003)	Dyspepsia, flatulence, constipation, loss of appetite, asthma, tonic, rheumatism, dysentery
Bombacaceae	*Bombax ceiba Linn.*	Hexacosanol, tocopherol, terenes, lupeol, β-sitosterol, triacontanol, β-sitosterol, henriacontane, quercetin, kaempferol (Joshi, 2003)	Chest diseases, fever, diuretic
Boraginaceae	*Cordia myxa Linn.*	Pectin, phosphorus, potassium, calcium, magnesium (Khan *et al.,* 2015)	Coughs, joint pains
Capparaceae	*Capparis aphylla Roth.*	Capric acid, quercetin (Khan *et al.,* 2015)	Rheumatism, heart diseases
Combretaceae	*Quisqualis indica Linn.*	Rutin, trigonelline, L-proline, L-asparagine, quisqualic acid, palmitic (Joshi, 2003)	Diarrhea, purgative, skin diseases
Convolvulaceae	*Ipomoea cairica Sweet*	Lignans, arctigenin, trachelogenin, arctigenin,	Rheumatism, inflammations

Family	Species	Constituents	Uses
		matairesinol, vanillic acid, stigmasterol (Lin *et al.,* 2008)	
	Ipomoea carnea Jacq.	Glycosides, tannins, flavone glycoside, saponin, L-rhamnose, D-fucose, D-chinovose, convolvulinolate, jalapinolate (Alam *et al.,* 2011)	Anti-rheumatic
	Euphorbia royleana Boiss.	Triterpenes, benzcoumarins, ellagic acid (Kibonde *et al.,* 2018)	Anti-inflammatory
Euphorbiaceae	*Ficus macrophylla Desf. ex Pers.*	Pectin, vitamin C (Khan *et al.,* 2015).	Gastro problems
	Jatropha integerrima Jacq.	Integerrimene, caniojane, 1,11-bisepicaniojane (Kayani *et al.,* 2015)	Laxative
	Ricinus communis Linn.	Ricinoleic acid, isoricinoleic, stearic, ricinin (Amjad *et al.,* 2017)	Purgative, rheumatism, diarrhea, sexual disorders
	Dalbergia sissoo Roxb. ex DC.	Isoflavone glycosides, biochanin, tectorigenin (Farag *et al.,* 2013)	Skin ailments, wound, burning sensations, dysentery, dyspepsia
	Parkinsonia aculeate L.	Flavonoids, glycosides, aerienne, organosaereos, glicosidos aromatic compounds, carbohydrates,glucide (Siddiqui *et al.,* 2006).	Anti-diabetic
Fabaceae	*Pithecellobium dulce* (Roxb.) Benth.	Hexane-dicloromethane, methanol, triacylglycerols, glycerol 1,3-dilinoleoyl-2-decanoic, glycerol 1-linoleoyl-2-docosanoic-3-olein (Joshi, 2003)	Fever, infection
	Pongamia pinnata (Linn.) Merr.	Karanjin, pongamol, glabrin, pinnatin, gamatin, kaempferol (Joshi, 2003)	Skin diseases, sexual diseases, diabetes
Lythraceae	*Lawsonia inermis Linn.*	Glucoside, xanthoes, β-ionone (Joshi, 2003)	Anti-inflammatory, skin problems
Malvaceae	*Hibiscus rosa-sinensis Linn.*	B-sitosterol, Quercetin-3-diglucoside, cyaniding-3-sophoroside-3-5glucoside (Joshi, 2003)	Sexual problems, neurological disorders
Meliaceae	*Azadirachta indica A. Juss.*	Nimbin, nimbinin, nimbidin, azharone, azadirone, isoazadironolide (Siddiqui *et al.,* 2006)	Skin diseases, healing of wounds
	Melia azedarach Linn.	Arabinofucoglucanes, fucogalactoglucoarabinanes, flavonoids, flavonoglycosides, dihydrochalocones, tannins (Siddiqui *et al.,* 2006)	Respiratory disorders, fever, vomiting, skin diseases
Mimosaceae	*Acacia nilotica L.*	Tannin, quercetin, gallic acid, catechin, epicatechin, dicatechin, leucocyanidin (Joshi, 2003)	Anti-diabetic, sore throats, chest pain, pneumonia, gastro diseases, anti-hypertensive
	Albizzia lebbeck Benth.	Anthraquinone glycosides, aerobes (Phillips and Gentry 1993), macrocyclicspermien alkaloids budmunchiamines 1-3, Albizziahexoside a new hexaglycosylatedsaponin (Zaman and Hazrat, 2013)	Respiratory problem, snakebite, scorpion sting, malaria/intermittent fever, anti-inflammatory

Family	Species	Constituents	Uses
Moraceae	*Leucaena leucocephala* (Lam.) De Wit.	Mimosine, glucosidequercetrin, hydrocyanic acid, leucaenine, quercitrin, tannic acid (Zaman and Hazrat, 2013)	Sexual problems
	Prosopis glandulosa Torr.	Prosopine, prosopinine, isoprosopinine, prosofrine, prosofrinine, prosopol (Lin *et al.,*2008)	Rheumatism, scorpion sting, sexual problems
	Ficus bengalensis Linn.	Bengalenoside, friedelin, quercetin, β-sitosterol, 3-galactoside, rutin, taraxasteroltiglate (Joshi, 2003)	Skin diseases, vaginal disorders, anti-inflammatory, asthma, nervous disorders, rheumatism, anti-diabetic
	Ficus benjamine Linn.	Proteose, amino acid, tyrosin, enzyme cravin, lipase, protease, pectose (Siddiqui *et. al.,* 2006)	Cuts and wounds
	Ficus carica Linn.	Flavonoids, rutin, tannins, ketoses, coumarins, psoralen, bergaptene, octacosane, valeric acids, guaiacol (Amjad *et al.,* 2017)	Laxative, kidney problems, fever, skin diseases, tonic
	Ficus elastic Linn.	Tannin, silica, phosphoric acid (Khan *et al.,* 2015)	Dysentery, respiratory problem
	Ficus infectoria Roxb.	Flavonoids, flavonol O-glycosides (Greenham *et. al.,* 2007)	Vaginal diseases
	Ficus religiosa Linn.	Phytosterolins, β-sitosterol-D-glucoside, vitamin K (Joshi, 2003)	Purgative, skin diseases, sexual diseases, asthma
	Morus alba Linn.	Mulberrin, mulberrochromene, morusin, cyclomorusin, mulberranol, alboctalol (Joshi, 2003)	Purgative, fever, respiratory diseases
	Morus nigra Linn.	Linoleic acid, myristic acid, glucose, fructose, stigmasterol, β-sitosterol, extract, rutin, carotene, vitamin B and C, pectin (Khambay *et. al.,* 1999)	Sexual weakness, diarrhea, ulcerated intestine,pharyngitis
Moringaceae	*Moringa oleifera Lam.*	Vitamin C, benzyl-isothiocyanate (Dayrit *et. al.,* 1990)	Anti-rheumatic, anti-inflammatory, snake bite and scorpion sting
Myrtaceae	*Callistemon viminalis G. Don.*	Viminadione A-B (Khambay *et. al.,* 1999)	Heart diseases
	Eucalyptus camaldulensis Dehnh.	Betulinic acid, oleanolic acid, ursolic acid, beta-phellandrene, p-cymene, cryptone (Siddiqui *et. al.,* 2006)	Coughs, throat ailments, diarrhea, dysentery, tonic
	Eugenia jambolana Lam.	Jambolin, ellagic acid, tannin, gallic acid, acetyl oleanolic acid, kaempferol, myricetin (Joshi, 2003)	Dysentery, diarrhea, diabetes, cough and asthma
	Psidium guajava Linn.	Galacturonic acid, rhamnose, β-sitosterol, maslinic acid, guijavalic acid, leucocyanidin (Joshi, 2003)	Vitamin C, tonic, wounds, vomiting, diarrhea, respiratory problems
Nyctaginaceae	*Bougainvillea spectabilis Willd.*	Ethylene, malondialdehyde, superoxide dismutase (Kayani *et al.,* 2015)	Infections
Oleaceae	*Jasminum sambac Ait.*	Pyridine, nicotinate derivatives (Joshi, 2003)	Insanity, anti-hyperstensive
Punicaceae	*Punica granatum Linn.*	Pelletierine, isopelletierine, pseudopelletierine, methyl-isopelletierine, sorbitol, mannitol, glucose, fructose, sucrose, maltose, isoquercetin, vitamin C	Fever, cough, bronchitis, vomiting, diarrhea, tonic

		(Lakhdari *et al.,* 2016)	
Rhamnaceae	*Zizyphus mauritiana Lamk.*	Leucocyanidin, leucopelargonidin, betulinic, ceabothic acid, rutin (Joshi, 2003)	Fever, diarrhea, laxative, kidney problems
Rosaceae	*Prunus percica* Batsch.	Hentriacontane, hentriacontanol, β-sitosterol, ursolic acid, multinoside-A, kaempferol-3-rhamnoside, quercetine (Joshi, 2003)	Cough, chronic bronchitis, vomiting
	Rosa indica Linn.	Anthocyanins, hydroxylations, epoxidations, epoxide, ellagitannins (Cheikhyoussef *et al.,* 2011).	Healing of wounds, fevers, sexual problems, laxative, tonic
Rutaceae	*Citrus aurantifolia Swingle*	Citral, hesperidin, nobiletin, citromitin, vitamin B, vitamin C, citric acid, synephrine (Amjad *et al.,* 2017)	Gastro problems
	Murraya paniculata (Linn.) Jack.	Murrayin, scopolin (Lakhdari *et al.,* 2016)	Respiratory diseases, cuts, diarrhea, dysentery
Salvadoraceae	*Salvadora oleoides Decne.*	Salvadorine, trimethylamine, phosphoric anhydride (Khan *et al.,* 2015)	Purgative, constipation, fevers, snake-bite, asthma, cough
Scrophulariaceae	*Leucophyllum candidum L.*	Diayangambin, epiyangambin, diasesartemin, epiashantin (Shahat *et al.,* 2005)	Gastro disorders
	Cestrum nocturnum L.	Spirostanolsaponin, furostanolsaponin, pseudo-furostanolsaponin (Maryo *et al.,* 2015)	Neural disorders
Solanaceae	*Withania sominiferaDunal.*	Withaferine A-B, 3α-tigloxytropine, cusohygrine, anaferine, anahygrine, choline, visamine (Lakhdari *et al.,* 2016)	Rheumatism, nervous disorders, sexual problems
Tamaricaceae	*Tamarix aphylla Karst.*	Tannic acid, dextrin (Khan *et al.,* 2015)	Eczema, respiratory diseases
	Duranta repens Linn.	Phenylethanoid glycoside acteoside, iridoidlamiide, saponin pseudo-ginsenoside (Shahat *et al.,* 2005)	Heart problems
Verbenaceae	*Gmelina philippensis Linn.*	Glucoside (Khan *et al.,* 2015)	Gastro disorders
	Lantana camara L.	Palmitic acid, stearic acid, germacrene-D, lantanoside, lantanone, lancamaric acid, camarolide (Shahat *et al.,* 2005)	Blood pressure, asthma, bronchiectasis, arterial hypertension, fever
	Vitex trifoliate L.	Alkaloids (Lakhdari *et al.,* 2016)	Rheumatism, headache

Table 6. Most vital and utilized plant species of the study area along with FL, RPL and ROP.

Sr. No.	Name of Species	N_P	N	NA	FL (%)	RPL	ROP
1	*Salvadora oleoides Decne.*	42	49	9	85.71	1.00	86
2	*Ficus religiosa Linn.*	34	42	5	80.95	1.00	81
3	*Calotropis procera (Ait) R. Br.*	29	37	10	78.38	1.00	78
4	*Acacia nilotica L.*	35	35	7	100.00	1.00	100

5	*Lawsonia inermis Linn.*	19	26	3	73.08	1.00	73
6	*Psidium guajava Linn.*	18	26	7	69.23	1.00	69
7	*Nerium oleander Linn.*	15	24	5	62.50	1.00	63
8	*Melia azedarach Linn.*	11	19	3	57.89	1.00	58
9	*Rosa indica Linn.*	9	17	6	52.94	1.00	53
10	*Punica granatum Linn.*	9	16	3	56.25	0.76	43
11	*Ficus carica Linn.*	7	15	4	46.67	0.71	33
12	*Mangifera indica Linn.*	5	15	7	33.33	0.71	24
13	*Carissa carandas Auct.*	3	13	6	23.08	0.62	14
14	*Azadirachta indica A. Juss.*	5	13	4	38.46	0.62	24
15	*Ricinus communis Linn.*	4	13	4	30.77	0.62	19
16	*Dalbergia sissoo Roxb. ex DC.*	6	12	9	50.00	0.57	29
17	*Albizzia lebbeck Benth.*	4	9	5	44.44	0.43	19
18	*Thevitia peruviana Pers.*	2	9	4	22.22	0.43	10
19	*Eucalyptus camaldulensis Dehnh.*	4	8	6	50.00	0.38	19
20	*Alstonia scholaris R. Br.*	3	7	3	42.86	0.33	14
21	*Zizyphus mauritiana Lamk.*	1	4	3	25.00	0.19	5

Np: No. of informants who reported use of species; **N:** number of total informants, **NA:** Number of ailments; **FL:** Fidelity level, **RPL:** Relative popularity level, **ROP:** Rank order priority

Table 7. The comparison of present study with earlier studies at the regional, national, and global scales.

Sr. No.	Previous study area	References	Total documented species in previous study	Total documented species in present study	Similar use of plant	Dissimilar use of plant	Plants common in both areas	%age of plant with similar uses	%age of plants with dissimilar uses	Jaccard Index (JI)
1	Buner, Pakistan	(Alam *et al.,* 2011)	141	61	1	2	1	0.71	1.42	0.50
2	Chaoshan, Guangdong, China	(Chan *et al.,* 2012)	86	61	1	5	2	1.16	5.81	1.38
3	Coastal areas of Pakistan	(Qasim *et al.,* 2014)	54	61	9	11	9	16.67	20.37	8.49
4	Fars, Iran	(Dolatkhahi *et al.,* 2014)	85	61	3	11	5	3.53	12.94	3.55
5	Guldara, Kabul, Afghanistan	(MH and Hamdam)	68	61	2	5	2	2.94	7.35	1.57
6	Hafizabad,Punjab, Pakistan	(Umair *et al.,* 2017)	85	61	17	27	19	20.00	31.76	14.96
7	Kel,Neelum Valley, AK,Pakistan	(Ahmad *et al.,* 2017)	50	61	2	3	1	4.00	6.00	0.91
8	Kembatta, Southern Ethiopia	(Maryo *et al.,* 2015)	145	61	2	10	4	1.38	6.90	1.98
9	KeraniganjUpazila, Bangladesh	(Amirunnesa *et al.,* 2018)	10	61	1	3	1	10.00	30.00	1.43
10	Makran coast, Pakistan	(Noman *et al.,* 2017)	40	61	5	14	6	12.50	35.00	6.32
11	Malakand, KPK, Pakistan	(Zaman and Hazrat, 2013)	40	61	6	12	5	15.00	30.00	5.21
12	Mbeya region, Tanzania	(Kibonde *et al.,* 2018)	31	61	5	6	4	16.13	19.35	4.55
13	Mirpurkhas, Sindh, Pakistan	(Hussain *et al.,* 2012)	53	61	14	21	18	26.42	39.62	18.75

14	Nellore, Andhra Pradesh, India	(Sasidhar *et al.,* 2016)	41	61	2	10	4	4.88	24.39	4.08
15	Northern areas of Pakistan	(Khan *et al.,* 2015)	51	61	2	2	1	3.92	3.92	0.91
16	Oshikoto region, Namibia	(Cheikhyoussef *et al.,* 201	61	61	1	3	1	1.64	4.92	0.83
17	OuedRigh, Algerian Sahara	(Lakhdari *et al.,* 2016)	53	61	2	6	2	3.77	11.32	1.79
18	Sheikupura, Pakistan	(Zahoor *et al.,* 2017)	96	61	14	33	13	14.58	34.38	9.03
19	Sulaymaniyah, Kurdistan, Iraq	(Ahmed, 2016)	63	61	1	2	1	1.59	3.17	0.81
20	Western Himalayan, Pakistan	(Haq, 2012)	172	61	13	22	11	7.56	12.79	4.95
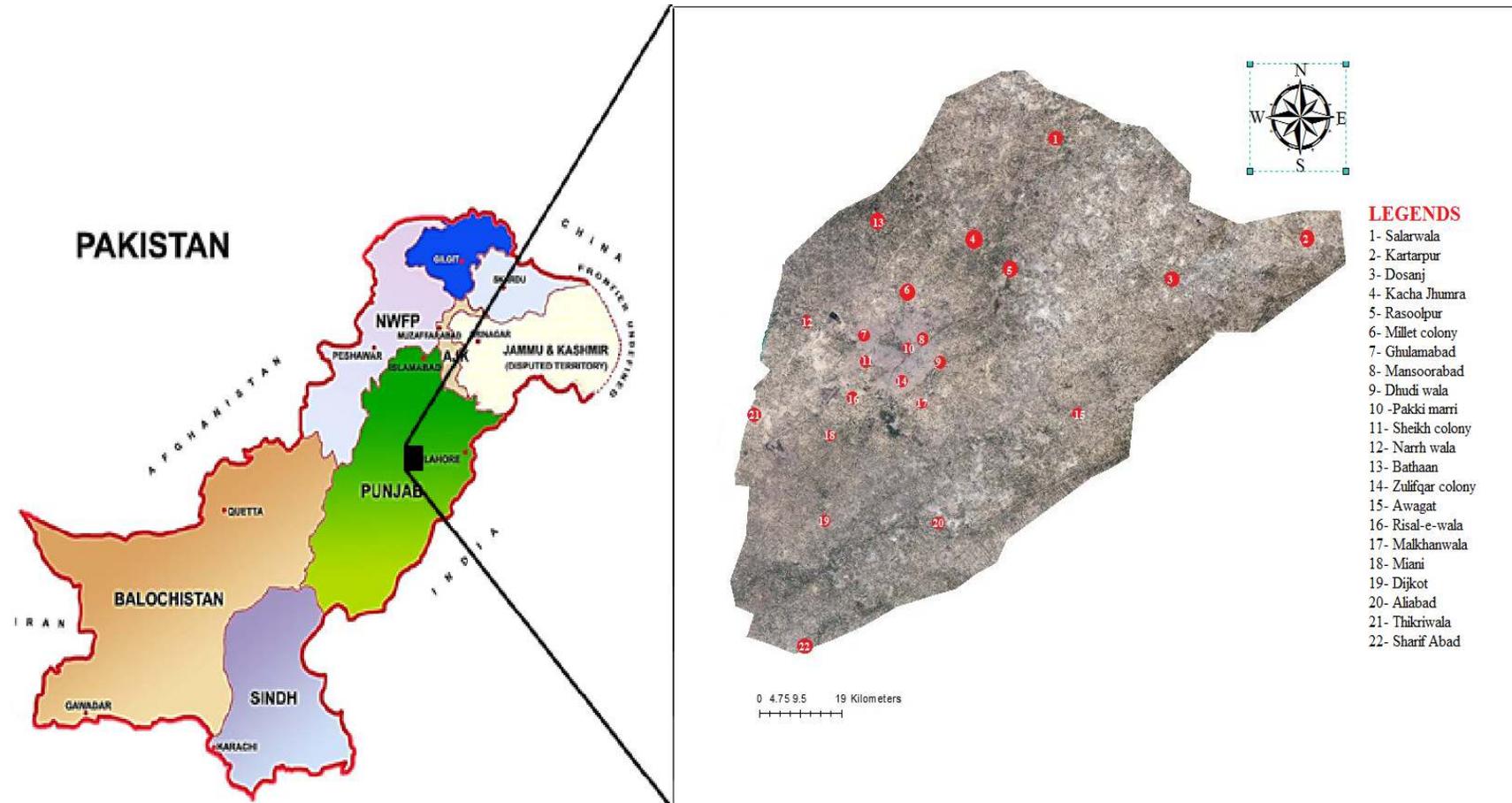
Figure 1. Geographical location of sampling sites across district Faisalabad, Pakistan

Figure 2. Photographic representation of Medicinal flora of Faisalabad district
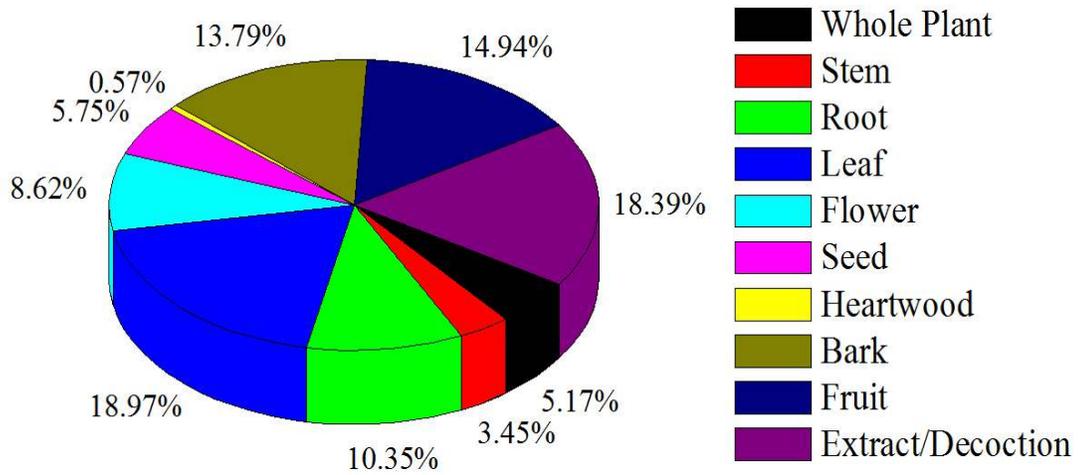
Figure 3. Graphical representation of plant parts used (%age)
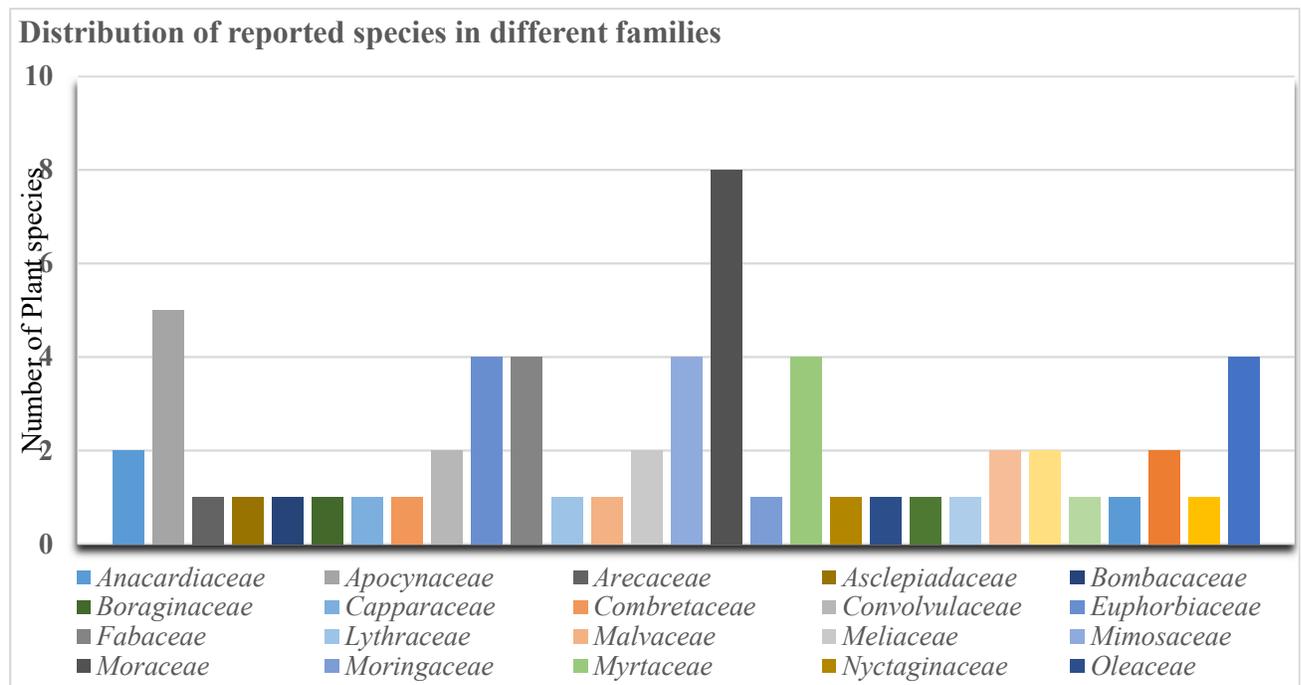
Figure 4. Graphical expression of reported species in families of Faisalabad district
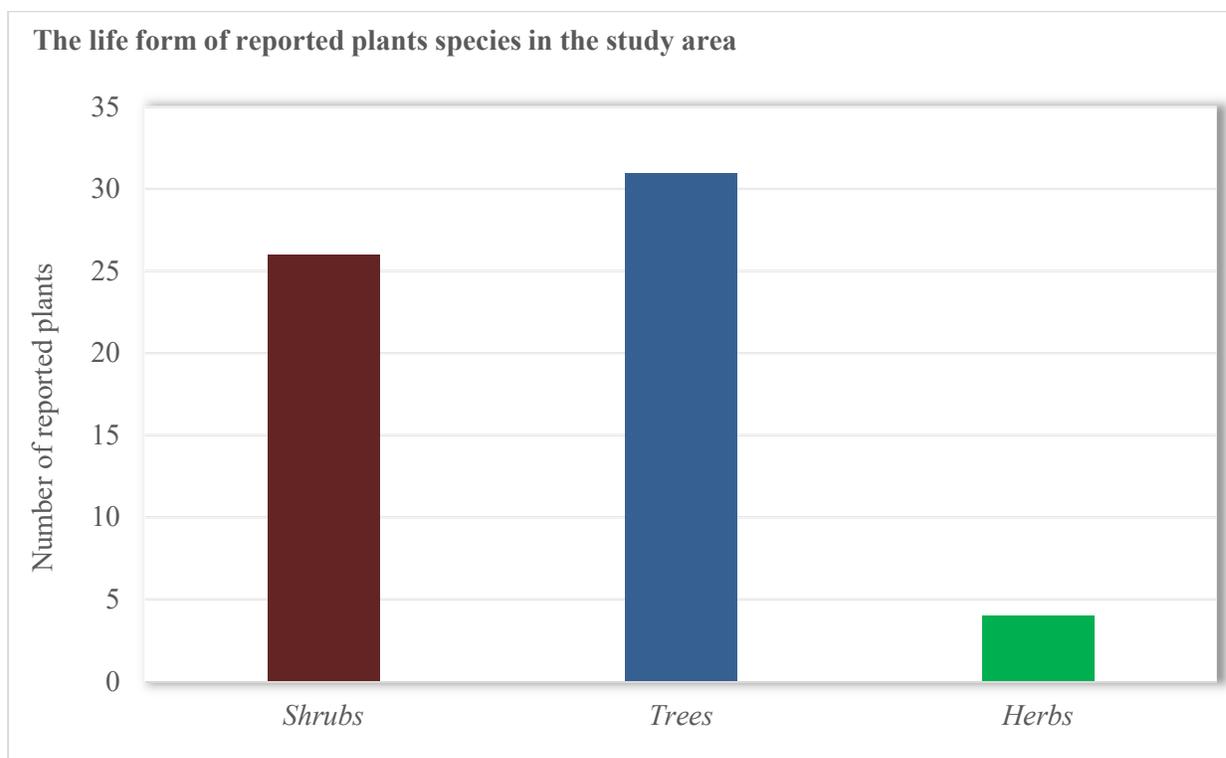
Figure 5. The life form of reported plants species in the study area

Conclusions: The current study reflects reliance of the natives of Faisalabad district on different medicinal plant species and utilized reported indigenous plant species to treat different diseases and to meet their medicinal needs. This ethno-botanical study is first document of district Faisalabad and indigenous knowledge (IK) has equipped us with the innovative ethno-medicinal data to make undocumented information available. The native community still trusts on traditional ethno-medicine and indigenous plants (IP) in spite of the modern health systems and specific drugs based on customary formulae and methods. Our findings offer reference line indigenous information to link the customary ethno-medicinal practitioners and scientific societies for preparing novel medicines. This ethnobotanical information is of substantial worth for conservatory policies and ministerial executives for ecological administration of ethno-medicinal flora at risk owing to haphazard urbanization, habitat loss and over exploitation. Extra exertions and exploration on sustainable utilization, conservation, marketing and management, ethnopharmacology and ethnobotany are vital to expose the wealth and prospective of ethno-medicinal flora of Pakistan. Hence the popular plants species must be anticipated thorough biochemical and pharmacological investigation for bioactive compounds, *in vivo/in vitro* biotic actions, which may be is a way of discover a novel and likely medicines. It will be a great contribution in the field of pharmacology and these medicinal plants be used at commercial level in medicinal or in a pharmaceutical industry for the human welfare. Furthermore, sustainable usages of this plant wealth will support diversity which in profit elevation of native ecotourism initiatives.

Author's contribution: MAA, NI, MA, AN and AM conducted surveys travelled to field and written manuscript. NK and WI compiled and analyzed data. SA and MH edited manuscript and provided funds for this study.

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