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List of some selected ptridophytes from Maidan valley of dir lower khyber Pakhtunkhwa Pakistan

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Abstract
A comprehensive research was carried out of fern-allies and ferns known to occur in Maidan Valley of Dir Lower Khyber Pakhtun Khwa Pakistan, which we have documented the medicinal value of selected ptridophytes. Out of the total number of taxa (taxa of fern allies and taxa of ferns) recorded from the selected area, a significant proportion is medicinally important. The highest number of medicinally important taxa amongst these, the genera *Dryopteris* (07) and *Asplenium* (06). For each taxon included is provided the botanical name, family, common parts used, chemical constituents and medicinal properties.

Keywords: Ptridophytes, dir lower, medicinal value, chemical constituents

1. Introduction
The pteridophytes, which include the fern-allies and ferns, are a group of ancient or primitive land vascular plants with worldwide distribution. As per the latest estimates (Wani *et al*., 2012), the area of study has 6 species and 1 subspecies (Total 7 taxa) of fern-allies, in 3 genera, belonging to 3 families; and 80 species, 22 subspecies and 4 hybrids (Total 106 taxa) of ferns, in 29 genera, belonging to 13 families. 47 taxa (42%) are recorded to be rare or endangered. Pteridophytes are the primitive land plants group on earth and established large group of vascular cryptograms. The position of the pteridophytes, between the lower cryptograms and higher vascular plants. Pteridophytes have a long ecological history on earth planet. They were known as far back as 380 million years ago. In our neighbor country India, Pteridophytes are mostly distributed in the Himalayan and coastal regions (Ullah *et al*., 2018). Pteridophytes also showed pharmaceutical ability and many of them are being used therapeutically (Kumar & Kaushik, 1999). The rural societies, ethnic groups and traditional throughout the world are using plant parts like rhizome, stem, fronds, pinnae and spores in various ways for the usage of several traditional since early time. Many researches are working on taxonomy, ecology and distribution of pteridophytes has been published from time to time but enough responsiveness has not been paid towards their pharmaceutical useful aspects (Singh, 2012). In the present study efforts have been made to search medicinally important pteridophytes and properly recognized their useful feature. Though recent Enthnobotanical, phytochemical, pharmacological and biological researches have revealed medicinal, pharmaceutical and phytochemical attributes of pteridophytes, which have valuable potential applications for health and industry, still many species of pteridophytes are yet to be explored for their potential applications for future use and to isolate new active principles from them (Singh, 2003) [5]. A proper utilization of their pharmacological value requires a detailed phytochemical analysis of the active principles contained in them, and the application of the same in modern system of medicine. The chemical properties and the nutritive contents of these ferns have to be understood for their proper and sustainable utilization.

2. Area of study
Maidan Valley is situated in Dir Lower District of Khyber Pakhtunkhwa Province, Pakistan covering an area of 300 sq km and located between 34° - 37/ to 35°-7 N Latitudes and 71°-31/to 72° - 14/ E longitudes. Maidan Valley is dominated by the southern part of Hindu Kush Mountain Range that has an altitude of 1800-2000 meters. Most of the population of the area

is involved in farming, agriculture, horticulture and sericulture. The summer season is moderately hot, June and July are hottest months and in June the temperature ranges from 15.6 °C to 32.5 °C. The winter season is cold and severe and the temperature decreases rapidly from November onwards. December, January and February are the coldest months, during which the temperature falls below 0 °C. During 2000, the average maximum and minimum temperature during the month of January were recorded as 11.2 °C and -2.4 °C respectively (Irfan *et al*., 2018) [6].

3. Materials and Methods

The present communication is primarily based on observations from the field and personal interactions with people and traditional healers (hakims) with herbal knowledge; and practitioners practicing Yunnani and Ayurvedic system of medicine were also consulted, to add to the knowledge of medicinal ferns. In documenting the medicinal uses of ferns, an exhaustive literature survey was carried out and an attempt made to provide comprehensive information on their potential medicinal applications. In the present communication, every effort has been made to make the work up to date by incorporating the latest nomenclature; however, in case of those taxa that have been split into subspecies due to recent taxonomic considerations, only the main species has been listed. For the presentation of data, all the species are arranged alphabetically for easy reference. Botanical name, family, common/vernacular name (wherever available), parts used, medicinal properties, chemical constituents etc. for each species are provided.

4. Alphabetical list of medicinal pteridophytes of dir lower valley khyber Pakhtunkhwa Fern Allies.

***Equisetum arvense* L.**
Family: *Equisetaceae.*
Common name: *Common Horsetail* (English).
Parts used: Whole plant.

Medicinal properties

The plant is used in fractured bones, tuberculosis, wound healing, dropsy, stone and kidney affections, bone cancer, diabetes, diarrhea, gout, dyspepsia, piles, sores, (Singh, 2003) [5].

Chemical constituents

Aconitic acid, Articulatin, Ascorbic acid, Beta-carotene, Beta-setosterol, Caffeic acid, Campesterol, Riboflavin, Selenium, Sterols, Thiamin, Vanillic acid, Vitamin C, Zinc, Dihydro kaempferol, Dihydro quercetin, Equisetin, Equisetonin, Equisetroside, Flavonoids, Galuteolin, Gossypitrin, Herb acetrin, Iron, Isofucosterol, Isoquercetroside, Kaemferol, Luteolin, Palustine, Palustinine, Phenolic acid, Quercetin, Rhodoxanthin, (Singh, 2003) [5].

Activities

Anti-fungal, Anti-viral, Diuretic, Haemopoietic, Haemostatic and Anti-rheumatic, (Singh, 2003) [5].

***Equisetum diffusum* D. Don**
Family: *Equisetaceae.*
Common name: *Himalayan Horsetail* (English).
Parts used: Whole plant.

Medicinal properties

Whole plant is used as a cooling medicine, in arthritis and gonorrhoea, (Singh, 2003) [5].

***Equisetum ramosissimum* Desf.**
Family: *Equisetaceae.*
Common Name: *Branched Horsetail* (English).
Parts Used: Whole plant; Young shoot and Rhizome.

Medicinal properties

An extract made into a paste of the plant is used as local application for treatment of fracture and dislocation of bones (Kumar *et al.*, 2003) [7]. The plant is also an astringent; used in diarrhea, gonorrhoea and improving fertility in women (Singh, 2003) [5]. The rhizome decoction of this plant is given to barren women to facilitate fertilization in S. Africa (Fakim, 2006).

Chemical constituents

Equisetonin, Ascorbic acid, Kaempferol, Vitamin C, Lipids and sterols, pyridine, Palustine, Dimethyl sulphane, Iso-quercetrin, Epigenin, Galiteolin, Equisetrin, (Singh and Vishwanathan, 1996).

Activities

Haemopritic, Diuretic, Haemostatic, Anti-fungal, Anti-rheumatic, Anti-viral. (Kumar *et al.*, 2003) [7].

Ferns

***Adiantum capillus-veneris* L.**
Family: Pteridaceae.
Common name: *Hair Fern* (English).
Parts used: Fronds, Whole plant and Rhizome.

Medicinal properties

This plant is used in the preparation of *'Sirop de Capillaire'* of Europe. This syrup is largely used in Italy and Greece in the treatment of chest complaints (Watt, 1889-1892). The herb has also entered into many compositions in the West. It is employed as an emmenagogue under the names of *'Polytrichi,' 'Polytrichon,* administered as a sweetened infusion of 1 or (30 cc) to a pint of boiling water (Khare, 2004) [11, 25, 32]. This plant is a weak expectorant, bechic, weak emmenagogue and weak diuretic, and is principally employed in chest complaints such as respiratory catarrh and coughs. Once it was used in the treatment of both pleurisy and asthma, but with little effect in the latter (Stuart, 1979) [20]. Whole plant is demulcent, expectorant and febrifuge, and also used as a hair tonic. Powdered fronds are given with honey against bad cold, extract used against fever (Naqshi *et al.*, 1992) [13], used as an emmenagogue (Chopra *et al.*, 1956) [14]. It has anti-microbial and hypo glycaemic properties (Neef *et al.*, 1995) [15]. It is anti-odontalgic and anti-inflammatory. Powdered fronds are applied on gums and tooth cavities during toothache and dental abscesses (Teresa Palmese *et al.*, 2001) [16]. Ethanol extract of 1 gm of rhizome per ml of alcohol exhibits strong activity against Vesicular Stomatitis Virus (Husson *et al.*, 1986). The fern is used as a pectoral demulcent. It is boiled in wine in cases of hard tumours of spleen, liver and other viscera (Anonymous, 1986) [18].

Chemical constituents

Contains Astragal in, Iso-quercetrin, Kaempferol-3o-

Rutinoside Sulphate, Nicotiflorin, Rutin (Singh, 2003; Sood *et al.*, 2005) [5, 19]; Tannins, Sugars (Stuart, 1979) [20]. 1-Caffey Glucose, 1-Coumaryl Galactose and Homoserine isolated from fronds (Singh and Vishwanathan, 1996; Sood *et al.*, 2005) [19]. It also contains Flavonoids, tanning material- Mucin, terpenoids and heterosides of Kaempferol, Luteolol and Quercetin (Bhattacharjee, 2004) [22].

Activities
Anti-implantation, Anti-viral, Febrifuge, Anti-bacterial, Anti-cancer, Antifungal, Hair tonic, Purgative, Wound healer (Singh, 2003) [5]; Demulcent, Hypoglycaemic (Duke, 2002) [23]; Depurative, Diaphoretic, Diuretic, Emetic, Emollient, Stimulant, Tonic (Duke and Ayensu, 1985) [24]. Astringent, Emmenagogue; Expectorant (Duke, 2002; Singh, 2003) [5]; Pectoral (Duke and Ayensu, 1985; Duke, 2002) [24, 23] Laxative (Duke and Ayensu, 1985) [24]. Not for use during pregnancy (Duke, 2002) [23]; also emetic in large doses (Khare, 2004) [11, 25, 32].

Adiantum incisum Forssk.
Family: Pteridaceae.
Common Name: *Hans raj* (Hindi).
Parts Used: Fronds; Pinnules, whole plant and Petioles.

Medicinal properties
The fern is aromatic, astringent, febrifuge and tonic. It is also used in hemicranias. The fronds are externally used in skin diseases and their juice for diabetes (Khare, 2004) [11, 25, 32]. The leaf powder of this fern is mixed with butter and used for controlling the internal burning of body; also used in cough, diabetes and skin diseases (Bhattacharjee, 2004) [22]. The young primules of this fern are eaten raw to cure diabetes (Sood *et al.*, 2005) [19]. The acetone and aqueous extracts of pinnules and petiole of this fern have shown inhibitory effect against *Salmonella typhii* (Parihar *et al.*, 2003).

Chemical constituents
Fernene steroids, Hentriacontane, Adiantone, Adiantanoreiso-Adiantone, β-sitosterol (Singh, 2003; Khare, 2004; Sood *et al.*, 2005) [5, 19, 11, 25, 32]; Tri-terpenoids and Flavonoids (Sood *et al.*, 2005) [19].

Activities
Anti-cancer, Antidiabetic, Anti-pyretic, Anti-bacterial, Emetic, Hypoglycaemic, Tonic Anti-tussive, Aromatic, Astringent, (Singh, 2003) [5]. Emetic in large doses (Khare, 2004) [11, 25, 32].

***Adiantum pedatum* L.**
Family: Pteridaceae.
Common Name: Northern Maiden Hair Fern (English).
Parts Used: Fronds and Rhizome.

Medicinal properties
The leaves are aromatic and bitterish have been supposed to be useful in chronic catarrhs and other pectoral affections. *A. capillus-veneris* has similar properties though is feebler. This is the French official species used in the preparation of the 'Sirop de Capillaire. *A. pedatum* is used like *A. capillus-veneris* "in similar ways and more highly valued by many" (Grieve, 1931) [26]. It is still used in North America as a pectoral in chronic catarrhs (Kirtikar and Basu, 1935) [27].

Chemical constituents
Caffeic acid, Fatty acids, Fernene, Ferulic acid, Adiantone, Filicene, Filicinal, Iso-fernene, p-Coumarin, pHydro Benzoic acid Adipedatol, Protocatechuic acid, Sterols, Tannin, Volatile oil and Vanillic acid, (Singh, 2003) [5].

Activities
Astringent, Emmenagogue, Stimulant, Tonic (Singh, 2003) [5], Pectoral (Duke, 2002) [23]; Propecic (Duke, 2002) [23]; decoction of rhizome used in chronic catarrh, cold, cough, hoarseness, Anti-rheumatic Demulcent (Duke, 2002) [23]; Diuretic (Anonymous, 2000); Emetic (Moerman, 1998); Expectorant (Duke, 2002; Singh, 2003) [5]. Dyspepsia, Fever, Gastrosis, Gonorrhoea, Hysteria, Insanity, Mastosis, Metrorrhagia, Paralysis, Pneumonia, Snakebite, Sore, Sting, Abortion, Ague, Backache, Cardiopathy, Childbirth, Cramps, Debility, Dysentery, (Moerman, 1998); Asthma (Grieve, 1931; Moerman, 1998) [26]; Bronchosis, Dysmenorrhoea, Grey hair, Pain, Pertussis, Respirosis (Duke, 2002) [23].

***Adiantum venustum* D. Don**
Family: Pteridaceae.
Common name: Geuwtheer.
Parts used: Fronds; Rhizome and Whole plant.

Medicinal properties
Used as a plaster, it is considered to be discutient, and is applied to chronic tumours of various kinds. The native physicians consider this fern to be deobstruent and resolvent, useful for curing the *prima viae* of bile, adust bile and phlegm; also pectoral, expectorant, diuretic and emmenagogue. It is recommended by *Hakims* for hydrophobia. It is resolvent and is also used for the prevention of hair from falling. For internal use, it is given in the form of syrup. It possesses aromatic and astringent properties, is emetic in large doses, and is an expectorant, febrifuge and tonic. In Chamba, it is pounded and applied to bruises *etc.*, and the plant appears to supply in the Punjab most of the official *Hansraj*, which is administered as an anodyne in bronchitis, and is considered diuretic and emmenagogue (Kirtikar and Basu, 1935) [27]. The plant has diuretic and astringent properties. Fronds are used as tonic, expectorant and in scorpion sting (Razdan, 1986) [30]. An oil extract of this plant is applied to piles and tuberculosis glands and wounds; also to bring out a thorn, which has penetrated into the body (*Yunnani*) (Kirtikar and Basu, 1935) [27].

Chemical constituents
Kaempferol, Leuco-pelargonidin, Quercetin glucosides, Adiantone, α Carotene mono-epoxide, traces of 3-Filicene (Sood *et al.*, 2005) [19]; a new Ketol-2-1-Hydroxy3-o-Norhopan-22-one, Triterpenoid keto alcohol (Sood *et al.*, 2005) [19]; Hydroxy Adiantone (Singh, 2003) [5].

Activities
Aphrodisiac, Bitter, Deobstruent, Purgative, Resolvent (Kirtikar and Basu, 1935) [27]; Anodyne, Anti-cancer, Anti-tuberculosis, Antiviral, Aromatic, Astringent, Emetic, Febrifuge, Emmenagogue; Expectorant (Kirtikar and Basu, 1935; Singh, 2003) [27, 5]. Tonic; used in bronchitis, ophthalmia and prevents hair fall (Singh, 2003) [5]; Diuretic (Kirtikar and Basu, 1935; Singh, 2003) [27, 5]; Biliousness,

Colds, diseases of the chest, Headache, Humours, Hydrophobia, Inflammations, Ophthalmia, Phlegmatic tumours (Kirtikar and Basu, 1935) [27].

***Aleuritopteris leptolepis* (Fraser-Jenk)**
Family: Pteridaceae.
Parts used: Fronds; Rhizome.
Medicinal properties
Fronds have anti-fungal properties; rhizome is anti-bacterial (Singh, 2003) [5].

Chemical constituents
Genkwanin, Kaempferol, Kumatakenin, Quercetin, Rhamnocitrin (Singh, 2003) [5].

***Asplenium adiantum-nigrum* L.**
Family: Aspleniaceae.
Common name: *Black Spleenwort* (English.
Parts used: Rhizome and Whole plant.

Medicinal properties
A decoction or syrup of the fronds is used as an expectorant (Razdan, 1986) [30], pectoral and emmenagogue in Europe (Kirtikar and Basu, 1935) [27]. The rhizome is used as an anthelminthic by the Sutos (Kirtikar and Basu, 1935; Singh, 2003) [27, 5]. The plant is bitter, diuretic, laxative, and is useful in treatment of ophthalmia, jaundice (Kirtikar and Basu, 1935; Singh, 2003) [27, 5] and diseases of the spleen, it also lessens inflammation, hiccup and produces sterility in women (Kirtikar and Basu, 1935; Razdan, 1986) [27, 30].

***Asplenium ceterach* L.**
Family: Aspleniaceae.
Common name: *Rusty Back Fern* (English).
Parts used: Whole plant.

Medicinal properties
The plant has diuretic properties, is used against complaints of spleen (Razdan, 1986) [30] and is astringent (Razdan, 1986) [30].

***Asplenium dalhousiae* Hook.**
Family: Aspleniaceae.
Parts used: Whole plant.
Medicinal properties: Whole plant is antibacterial (Singh, 2003) [5].

***Asplenium ruta-muraria* L.**
Family: Aspleniaceae.
Common name: Wall Rue (English).
Parts used: Fronds and Whole plant.

Medicinal properties
The leaves are used as a remedy for the cure of rickets (Singh, 2003, Kirtikar and Basu, 1935) [27] also used against knots and swellings (Singh, 2003) [5]. The small herb is used as deobstruent and expectorant (Kirtikar and Basu, 1935; Singh, 2003) [27, 5]. It is likewise good for them that have cough, or are short-winded, or be troubled with stitches in the sides.

***Asplenium trichomanes* L.**
Family: Aspleniaceae.
Common name: *Delicate Maiden Hair Spleenwort* (English).

Medicinal properties
The leaves are smoked by the Sutos for colds in the head and chest (Kirtikar and Basu, 1935; Razdan, 1986) [27, 30]. It is used as laxative and expectorant (Kirtikar and Basu, 1935; Razdan, 1986; Singh, 2003) [27, 30, 5].

Chemical constituents
Catechol, Gallic acid, Pyrogallol (Singh, 2003) [5].

Activities
Insecticidal, Laxative, Pectoral, Pesticidal, Refrigerant, Tonic Anthelminthic, Expectorant, (Singh, 2003) [5].
Asplenium viride* *Huds. Nom. cons.
Family: Aspleniaceae.
Common Name: Green Spleenwort (English).
Parts Used: Fronds.

Medicinal properties
Fronds are applied on burns (Singh, 2003) [5].

***Athyrium schimperii* Moug. Ex Fee**
Family: Woodsiaceae.
Parts Used: Sporophyll.

Medicinal properties
The Sporophyll of this fern possess anti-bacterial properties (Singh, 2003) [5].

***Azolla pinnata* R. Br.**
Family: Azollaceae.
Parts used: Whole plant.

Medicinal properties
Anti-bacterial, Anti-fungal (Singh, 2003) [5]. The rhizome is used as an anthelminthic by the Sutos (Kirtikar and Basu, 1935; Singh, 2003) [27, 5].

Chemical constituents
Proteins, Carotenoids. Carbohydrates, phenols (Singh, 2003) [5].

***Botrychium lunaria* (L.) Sw.**
Family: Ophioglossaceae.
Common name: *Moonwort* (English).

Medicinal properties
It is culinary and has anti-cancer properties (Singh, 2003) [5]. The plant is a good vulnerary and is used in dysentery also (Kirtikar and Basu, 1935; Singh, 2003) [27, 5].

***Botrychium virginianum* (L.) Sw.**
Family: Ophioglossaceae.
Parts Used: Whole plant.

Medicinal properties
Anti-bacterial whole plant is anti-dysenteric and; rhizome is vulnerary (Singh, 2003) [5].

Chemical constituents
Caffeic acid, pcoumaric acid, p-Hydroxybenzoic acid (Singh, 2003) [5].

***Cyrtomium caryotideum* (Wall. ex Hook).**
Family: Dryopteridaceae.
Parts used: Whole plant are used.

Medicinal properties
Whole plant is antibacterial and anthelminthic (Singh, 2003) [5].

***Cystopteris fragilis* (L.) Bernh.**
Family: Woodsiaceae.
Common name: *Fragile Fern* (English).
Parts Used: Rhizome and sometime whole plants.

Medicinal properties
Decoction of rhizome is used as an anthelminthic (Razdan, 1986; Singh, 2003) [30, 5].

***Dryopteris barbigera* (T. Moore ex Hook.) Kuntze**
Family: Dryopteridaceae.
Parts used: Rhizome.

Medicinal properties
Rhizome is anthelminthic (Mittal and Bir, 2006) [31].

Chemical constituents:
Filicene (Singh, 2003) [5]; Oleoresin, Filicin (Mittal and Bir, 2006) [31].

***Dryopteris blanfordii* (Hope) C. Chr.**
Family: Dryopteridaceae.
Parts Used: Rhizome also leaves.

Medicinal properties
Rhizome is anthelminthic (Mittal and Bir, 2006) [31].

Chemical Constituents
Filicene (Singh, 2003) [5]; Oleoresin, Filicin (2.6%) (Mittal and Bir, 2006) [31].

***Dryopteris chrysocoma* (Christ) C. Chr.**
Family: Dryopteridaceae.
Parts Used: whole plants and Rhizome.

Medicinal properties
Rhizome is anthelminthic (Singh, 2003) [5].

Chemical constituents
Filicene (Singh, 2003) [5]; Oleoresin, Filicin ((Mittal and Bir, 2006; 2007) [31].

***Dryopteris filix-mas* (L.) Schott**
Family: Dryopteridaceae.
Common name: *Male Fern* (English).
Parts used; Oleoresin extracted from the root, Whole plant; Fronds; Rhizomes.

Medicinal properties
The root is prescribed with non-oily purgative. Preparations of *Male Fern* are used externally for rheumatism, muscle pain, neuralgia and sciatica. *Male Fern* root or its oleoresin is used as a specific treatment for tapeworms. It acts by paralysing the muscles of the worm, forcing it to relax its hold on the gut wall. (Khare, 2004) [11, 25, 32].

Chemical constituents
Desaspidin, Filicin, Filicinic acid, Paraspidin, Trisflavaspidic acid (Khare, 2004) [11, 25, 32]; Albaspidin, Arachidic acid, Aspidin, Aspidinol, Butyric acid, Caffeic acid, Fernene, Ferulic acid, Filicylbutanone, Filmarone, Flavaspidic acid, Glucose, Hexanol, Hopadiene, Hopene, Isobutyric acid, Linoleic acid, Linolenic acid, Phlobaphene, Phloraspidinol, Phloroglucin, Phloropyron, Protocatechuic acid, Pseudoaspidin, Sugars, Tannins, Tris Aspidin Tris Desaspidin, Vanillic phenolic acids (Singh, 2003) [5]. In addition, the fern contains triterpenes, alkanes, a volatile oil and resins (Khare, 2004) [11, 25, 32].

Activities
Abortifacient, Anti-bacterial, Antiseptic (Gupta, 1995); Anthelminthic (Razdan, 1986; Singh, 2003) [30, 5]; Anti-viral (Duke, 2002; Singh, 2003) [23, 5]; Anti-cancer, Anti-fungal, Anti-rheumatic (Singh, 2003) [5]; Contraceptive (Gupta, 1995; Singh, 2003) [5]; Cytotoxic (Duke, 2002) [23]; Aperient, Astringent, Cyanogenic, Insecticide (Duke, 1985; Singh, 2003) [5]; Laxative, Poison (Duke, 1985) [24]; Pectoral (Steinmetz, 1957; Duke, 1985) [24]; Taenifuge (Duke, 1985; Williamson and Evans, 1988) [24]; Vermifuge (Grieve, 1931; Duke, 1985; Razdan, 1986; Williamson and Evans, 1988; Duke, 2002) [26, 24, 30]. Wound (Duke, 1985; Duke, 2002) [24, 23]. Canadians do not allow its use as a non-medical ingredient for oral use products (Guffin *et al.*, 1997). Also contraindicated in anemia, Cardiopathy, diabetes, Hepatosis and nephritis (Duke, 2002) [23].

***Dryopteris ramosa* (Hope) C. Chr.**
Family: Dryopteridaceae.
Parts Used: Rhizome.

Medicinal properties
Rhizome is anti-bacterial (Singh, 2003) [5] and anthelminthic (Mittal and Bir, 2006) [31].

Chemical constituents
Oleoresin, Filicin (Mittal and Bir, 2006) [31].
***Dryopteris serrato-dentata* (Bedd.)**
Family: Dryopteridaceae.
Parts Used: Rhizome.

Medicinal properties
Rhizome is anthelminthic (Mittal and Bir, 2006) [31].

Chemical constituents
Oleoresin Filicin, (Mittal and Bir, 2006) [31].
***Dryopteris xanthomelas* (Christ) C. Chr.**
Family: Dryopteridaceae.
Parts Used: Rhizome.

Medicinal properties
Rhizome is anthelminthic (Mittal and Bir, 2006) [31].

Chemical constituents
Oleoresin, Phenol, glycosides, Filicin (Mittal and Bir, 2006) [31].

***Marsilea minuta* L.**
Family: Marsileaceae.
Common name: *Paflu* (Kashmiri).
Parts used: Petiole; Rhizome, Whole plant; Leaves.

Medicinal properties
Plants are used in cough, spastic condition of leg, muscles *etc.*, and also in insomnia and sedatum. The decoction of leaves, along with ginger is used against bronchitis and cough (Bhattacharjee, 2004) [22]. The plants are known to be acrid, anodyne, diuretic, emollient, expectorant, febrifuge, hypnotic, ophthalmic and refrigerant. Aphrodisiac, astringent, depurative, it is useful in diarrhea, dyspepsia, fever, hemorrhoids, leprosy, ophthalmia, psychopathy, skin diseases and strangury (Warrier *et al*., 1996) [38]. The herb has also shown antifungal activity against *Aspergillus flavus* (Parihar *et al.*, 2002) [39].

Chemical constituents
B-carotene, Calcium, Phosphorus, Potassium, Protein (24-36%), Sodium (Kumar *et al.*, 2003; Singh, 2003) [5]; Marsilene (Singh, 2003) [5].

Activities
Anti-fungal, Anti-rheumatic, Antitussive Alexiteric, Anti-bacterial, Anticonvulsant, Diuretic, Refrigerant, Resolvent, Sedative (Singh, 2003) [5]. Abscess, Backache, Diarrhoea, Dyslactation, Fracture, Impetigo, Inflammation, Menorrhagia, Myalgia, Snakebite, Sore, Trauma (Singh, 2003) [5].

***Onychium cryptogrammoides* Christ**
Family: Pteridaceae.
Parts Used: Whole plant.
Medicinal properties
Whole plant is antibacterial (Singh, 2003) [5].

***Onychium japonicum* (Thunb.) Kunze**
Family: Pteridaceae
Parts Used: Rhizome and Leaves.

Medicinal Properties
Leaves and rhizomes contain glycoside which yields Kaempferol and Rhamnose on hydrolysis. Juice of crushed leaves prevents falling of hairs. (Benniamin, 2011).

***Ophioglossum reticulatum* L.**
Family: Ophioglossaceae.
Common Name: Chonchur (Kashmiri).
Parts Used: Rhizome, Fleshy fronds.

Medicinal properties
The herb is used as a cooling agent and in the treatment of wounds and inflammations; fronds used as a tonic and styptic; also in contusions and haemorrhages (Singh, 1999; Kumar *et al.*, 2003) [7].

***Osmunda claytoniana* L.**
Family: Osmundaceae.
Common Name: *Interrupted Fern* (English).
Parts Used: Rhizome and Whole plant.

Medicinal properties
The rootstock and stipe bases of this fern are employed as adulterant, as a substitute for the *Male Fern* (Razdan, 1986) [30]; whole plant is anti-bacterial (Singh, 2003) [5].

***Polystichum squarrosum* (D. Don) Fee**
Family: Dryopteridaceae.
Parts Used: Sporophylls and Fronds.

Medicinal properties
The sporophyll extract of this fern is used as an anti-bacterial agent (Kumar *et al.*, 2003; Singh, 2003) [5, 7]; fronds are anti-rheumatic (Singh, 2003) [5].

***Pteridium revolutum* (Blume) Nakai**
Family: Dennstaedtiaceae.
Parts used: Rhizome; Fronds.
Medicinal properties:
Rhizome is astringent, anthelmintic, and is useful in diarrhoea and for the treatment of inflammation in the gastric and intestinal mucous membranes. Decoction of rhizome and frond is given for the chronic disorders of viscera and spleen. Rhizome is boiled in oil and is made into an ointment for healing wounds. Fronds are reported to be poisonous and sometimes fatal to the grazing animals (Benniamin, 2011).

Pteris cretica L.
Family: Pteridaceae.
Parts Used: Fronds.
Medicinal Properties:
The fronds, which are anti-bacterial, are made into paste and applied to wounds (Singh, 1999; Kumar *et al*., 2003; Singh, 2003) [5, 7].

***Pteris vittata* L.**
Family: Pteridaceae.
Common name: *Chinese Brake Fern* (English).
Parts used: Fronds and Whole plant.

Medicinal properties
The tribal *Chenchu* people of Andhra-Pradesh (India) use the herb juice in curing diarrhoea and dysentery. Plant extract is used as anti-bacterial and anti-viral agent (Kumar *et al.*, 2003) [7]; anti-fungal (Bhattacharyya *et al.*, 2009) [41]; demulcent, hypotensive, tonic (Kumar *et al.*, 2003) [7].

Chemical Constituents:
Phenols (Singh, 2003; Bhattacharyya *et al*., 2009) [41]; Proteins (Bhattacharyya *et al.*, 2009) [41]. ***Thelypteris arida (D. Don) C.V. Morton***
Family: Thelypteridaceae.
Parts Used: Rhizome and leaves.
Medicinal Properties
Rhizome is used against veterinary larval infections (Singh, 2003) [5].

***Thelypteris dentata* (Forssk.) E.P. St. John**
Family: Thelypteridaceae.
Parts Used: Fronds; Rhizome.

Medicinal properties
Rhizome and fronds inhibit the growth of the fungi *Rhizopus sp*. and *Fusarium udum* (Bhattacharyya *et al.*, 2009) [41]. Phenol extract from rhizome of vegetative and reproductive parts contain antifungal properties, and shows inhibitory effect against *Trametes hirsuta* and *Curvularia sp.* (Bhattacharyya *et al.*, 2008) [42].

Chemical constituents
Amino acids, Phenols, Proteins (Bhattacharyya *et al.*, 2009)

[41].

5. Conclusion

From the present research work we conclude that total fern allies and ferns recorded from the Maidan valley of Khyber Pakhtun Khwa Pakistan, a significant proportion is medicinally important. Amongst these, the families Dryopteridaceae and Pteridaceae contain the more number of important medicinally genera. Six from *Asplenium* and seven ferns from genus *Dryopteris* are medicinally very important. By traditional healers many of these medicinally active ferns have been used ethno botanically and the local tabib against various disorders, and these still constitute a significant bulk of medicine in the Ayurvedic and Yunnani systems of medicine. With developments in pharmacology and phytochemistry is a scope that the active components contained in the selected plants can be characterized and identified these can be put to effective tonic use. Since several of the medicinally important taxa documented from Maidan valley have exposed a marked decline in their numbers as well as in their altitudinal distribution over the years, particularly due to rampant over-exploitation and habitat destruction, hence there is an urgent need to conserve various pteridophytes habitats, and also to make the local public aware about their potential medicinal applications.

6. References

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