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Taxonomic and ethnobotanical study of *Ranunculaceae* from Dir Upper, Khyber Pakhtunkhwa, Pakistan

Ali Hazrat[1], Khan Sher[2], Gul Rahim[1], Jehan Zada[1], Muhammad Mukhtiar[3], Zakia Ahmad[4], Zahid Fazal[5], Shabana Bibi[12], Amir Hassan[2], Abid Ullah[1] and Mohammad Nisar[1]

[1]Department of Botany University of Malakand, Chakdara, Dir Lower, **Pakistan**
[2]Department of Botany Shaheed Benazir Bhutto University Sheringal Dir Upper, **Pakistan**
[3]Department of Pharmacy, University of Poonch Rawalakot, Azad Kashmir, **Pakistan**
[4]Department of Botany University of Swat, KP, **Pakistan**
[5]Department of Botany University of Peshawar, **Pakistan**

***Correspondence: aliuom@gmail.com** **Received 04-04-2020, Revised: 23-04-2020, Accepted: 01-05-2020 e-Published: 08-06-2020**

The selected family is a large angiospermic family having 2346 species and 43 genera in the world. And in the present study a total of 32 taxa were collected representing 14 genera. Thirty one species of the selected family were grown wild and only one specie (*Consolida ambigua)* is cultivated. While four genera *Ranunculus, Adonis*, *Ceratocephala* and *Clematis* of the selected family is widely distributed in the study area. Furthermore, all the species are a new records from the selected area and one specie *Delphinium himalayai* Munz is new record from Pakistan. The obtained taxa were identified with the help of the taxonomic key. Furthermore the study was extended to the ethnobotanical uses of species of the selected family. For this study targeted spots were visited in blooming season of plants. The data collected from local people through semi structured questionnaire i.e local name of the plant species, locality in the area, local uses, part used data and flowering season. Mostly the part used data are root, whole plant, leaves, flower, fruit and seed were in common use. The species use data were also noted in the filed like rheumatism, tonic, antispasmodic, anticancer, painkiller, diuretic, febrifuges, carminative, anthelmintic, anti-inflammatory, aphrodisiac, cardio tonic, stomachache, dyspepsia, jaundice, leprosy, cough, asthma, ulcers, vomiting etc. The area has a diverse habitats for the growth of various medicinal plants. The area was selected for the first time for such type of study. The study will be help full in future for researcher to work on the selected species to find out their active ingredients

Keywords: Ranunculaceae, Taxonomy, Ethnobotany, District Dir Upper, Pakistan

INTRODUCTION

The family is an angiospermic, worldwide distributed especially in subtropical regions and temperate, commonly herbs (Christenhusz and Byng, 2016). This family has been considered within the dicots (Soltis et al. 2005; Heywood et al. 2007; Simpson 2010). They are the greatest primitive of the herbaceous angiosperm. Some of the primitive characters found in the family are, numerous and spiral arrangement of floral parts, imperfect carpel, apocarps and follicles. Though, many characterized as advanced like finely dissected leaves, perforations, unisexual flowers, zygomorphic flowers, specialized spurred petal

and achenes. So while some members of the family may be observed as representative of the primitive condition, others have developed advanced characters (Tamura, 1967). The study area is lush green with a variety of species, belonging to Angiosperm, Gymnosperm and other groups of plants. A rich diversity of the selected family plant species are also available in the research area (Hazrat et al., 2007). The selected family species are available in the form of herbs and shrubs. The leaves are alternate, simple and palmately compound (Perveen, 2000). ‘’Pakistan having a very prominent position in the table of developing countries because of rich flora of medicinal plants, variable edaphic factor and climatic factor. Furthermore the area is blessed with many ecological areas and topographical regions which pays significantly to rich biodiversity of the area (Hussain et al., 2009). A total of 6000 plants species, are reported to have medicinal value while most of them are yet to be studied (Shinwari, 1996). Conservational policies are the need of the hour for medicinal plants as well for indigenous knowledge (Shinwari et al., 2003; Shinwari & Qaiser., 2011). The species of the selected family are very important for Medicinal purposes People everywhere in the area are familiar with its cultivation, usage and any toxic effect (Hazrat et al., 2007). All the plant natural resources are gifted with tremendous natural chemical compounds that are potentially rich for further exploitation by the human being for diverse purposes. But classically only those plants which have been in practice for the treatment of various ailments in a particular region or the plants serve as a starting material for chemical or pharmaceutical synthesis. It is a sacred and obligatory duly from the time immemorial. There are several systems of medicine practiced in the World, every system with its own basic philosophy and therapeutics, but the common object is always the alleviation of diseases. In Pakistan, the traditional system of medicine dates back to Indus civilization, which has been verified by the excavation, conducted in the buried cities of Mohenjaradaro and Harappa, as well as Taxila, which flourished during the Gandahara period. These findings clearly reveal the importance of medicinal plants in the lives and religious teaching of the said civilizations (Sher 1998). Modern medicine traces its origin of the Greeks. The Greek medicine was taken over by the Arabs, from whom (after its enrichment with Chinese and Indian medicine) it was taken over by modern Europe. The Muslim rulers introduced (Arshad & Akram 1999) it into India and incorporated with it the native Ayurvedic medicine, this mixture is now known as Unani medicine or broadly speaking Eastern medicine. The traditional Indian system of medicine known as Ayurveda, which evolved during the period commencing from around 2500 B.C has been codified and documented by 600 B.C. Ayurveda was adopted by the Hindu people, while

the Muslim people of the sub-continent followed a different traditional systems known as Unani. Later on these both systems Ayruveda and Unani” benefited and complemented from each other. The dominant traditional system in Pakistan is the Unani system. In Pakistan there are 50,000 Hakims (Shinwari et al., 2002) spread all over the country who run their clinics in rural and urban areas and use medicinal plants. According to Unani system, Pakistan has rich flora in which 2,000 plant species are used for medicinal purposes but out of these only 400 to 600 plant species are documented and studied for medicinal purposes. Beside Hakims the rural area dwellers use the plants on their own experiences. Owing to the deficiency of allopathic doctors and medicine in the remote areas and to some extent fears of side effects of modern medicine are inviting local people to the traditional systems. This remote area was selected to revive the old tradition because in past there was deficiency of doctor and the Hakims resorted to different medicinal plants as a treatment to different disease (Battacharjee 2004, Prajapati et al., 2004 Shinwari and Gilani 2003). The eastern medicine practiced in Pakistan comprises three systems Chinese, Ayurvedic and Greco Arabic. The recipes of medicines used in these systems are derived

from both organic and inorganic sources. The knowledge of drugs goes back to prehistoric times. Records of ancient civilizations show that a considerable number of drugs, used by modern doctors, were already in use of Egyptians, Babylonians, Greeks, Romans, Chinese and peoples of the subcontinent of India and Pakistan (Khan, 1991). The goal of the present study is the contribution to the knowledge of Ranunculaceae from different point of view viz. Exploration and identification with the help of taxonomic key of the selected taxa.

MATERIALS AND METHODS

Thirty two species belonging to fourteen genera of Ranunculaceae were collected from different localities in Dir upper as shown in table 1. Different villages of the selected district were

visited for the collection of plant specimens of the selected family in order to explore the total number of species and genera in the selected area. The tools available during the research work are map of the area, plant presser, note book, pencil, old newspaper, knife, compass, polythene bags and digital camera. The plants were collected during different periods of the season. Many species were collected during the field visit and put in the newspaper, pressed in the plant presser for 2-3 days and change the newspaper daily to remove the moisture. After this processes identified the plants on the basis of morphological characters with help of available literature (Stewart., 1972 and Ali & Qasir., 1993-2009). Then provide the voucher number to all species and mount on the herbarium sheet according to stander procedure of (Ali & Qasir., 2009) and placed in the herbarium of Malakand University for future reference for the researchers. Plant species usage data were collected from local people and hakims that practice the use of plant species regularly. The data were collected through a questionnaire in the targeted area.

RESULTS AND DISCUSSION

The study was conducted for the collection of plant species of the selected family from all the target spots of the research area. A total of 32 species belonging to 14 genera of the selected family were collected. The leading genus is *Ranunculus* having 08 species, while the genus *Clematis* (4 spp), *Delphinium* (4 spp), *Aconitum* (3 spp), *Anemone* (3 spp), *Adonis* (2 spp), *Aquilegia Batrachium*, *Consolida*, *Caltha*, *Actaea, Ceratocephala*, *Nigella* and *Thalictrum* have 01 specie each (Figure 1). Furthermore, the plants species are widely distributed in the research area. The plant species were identified with the help of keys in the form species keys and genera keys. Furthermore the ethnobotanical information were are also collected in the area. A total of 32 species were collected and documented from research area out of these 15 plants were used in various ailments such as febrifuge 14; astringent 2; expectorant 4; tonic 10; stimulant 5; emollient 6; laxative 8; tonic 7; poisonous 7; diuretic 7; carminative 6; leprosy 6; painkiller 6; dyspepsia 5; anthelmintic 5; cough 5; jaundice 5; asthma 4; stomachache 4; purgative 3; vomiting 3; toothache 3; bitter 3; emmenagogue 3; cardiotonic 2; each was used as astringent, cold, sedative, cardiac, colic, bronchitis, irritant, cancer, ulcer, anodyne, digestive, inflammatory, rheumatism, constipating, aromatic, constipating, rheumatism. One each was used as cardio poison, appetizer, diarrhoea, gastric pain, piles, insecticides, hysteria, measles, small pox, aphrodisiac, burning, antibacterial, deodorant, appetizing, sudorific, thermogenic (Hussain, 1987;

Nasir, 1970-2002; Ahmad, 2000). The species checklist is available in the form voucher number, Botanical Name, Vernacular name, research area part used and medicinal used in table 01.

Table 1: Check list of Ranunculaceae Species

S.No	V. No	Botanical Name	Vernacular Name	Research Area	Part Used	Uses
1.	66	*Adonis aestivalis* L.	Banra Kot	Sheringal, Shahoor, Dogdara,	Whole plant	Cardiotonic, diuretic and stimulant
2.	507	*Adonis dentatus* Delile	Spenstargae	Dogdara, Sunderae, Lamutai	Whole Plant	Poisonous, anticancer, sore throat, gastritis and debility
3.	11	*Aconitum laeve* Royle	Gar zahar	Janus kanduo, Shahoor, Dogdara	Rhizome	Rheumatic fever, painful joints and some endocrinal disorders
4.	98	*Aconitum violaceum* Jacq. ex Stapf	Zahar botay	Kashura, Shahoor, Dogdara	Rhizome	Antidote, anti-inflammatory and febrifuge, snake and scorpion bites
5.	753	*Aconitum heterophyllum* Wall.	Zahar mora	Ganshal, Shahoor, Dogdara	Rhizome	Analgesic, anti-inflammatory, antiperiodic, aphrodisiac, astringent, cholagogue, febrifuge and tonic
6.	27	*Actaea spicata* L.	Thra dana	Kumrat, Shahoor, Dogdara	Fruit, leaves	Rheumatism, inflammation, nerve diseases
7.	782	*Anemone falconeri* Thoms.	Spinsar bouti	Kumrat, Shahoor, Dogdara	Whole Plant	Anticancer
8.	08	*Anemone obtusiloba* D.Don	Spinsar Bouti	Shahoor, Dogdara, Sheringal	Whole Plant	Vomiting, rheumatism and opthalmic
9.	774	*Anemone rupicola* Camb.	Spin Gwalae	Sheringal, Sunderae, Lamutai	Whole Plant	Traumatic injury, rheumatic arthralgia,

						enteritis and dysentery
10.	764	*Aquilegia fragrans* Bth.	Zaire Gwalae	Kumrat, Shahoor, Dogdara	Whole Plant	Astringent, depurative, diaphoretic, diuretic and parasiticide
11.	1009	*Batrachium trichophyllum* Chaix	Water gul	Sheringal, Shahoor, Dogdara	Nil	No activity are found
12.	07	*Consolida ambigua* (L.)	Kharar gul	Cultivated	Whole Plant	Heal wounds and Piles
13.	752	*Caltha alba* Camb.	Makhanr Path	Kumrat, Shahoor, Dogdara	Whole Plant	Anodyne, antispasmodic, diaphoretic, diuretic, expectorant
14.	763	*Ceratocephala falcata* (L.) Pers.	Tore botay	Sheringal, Shahoor, Dogdara	Whole Plant	Not found any use
15.	135	*Clematis aspleniifolia* Buch.	Zelai	Sheringal, Shahoor, Dogdara	Leaves	pain (rheumatism), headaches, varicose veins, syphilis, gout, bone disorders,
16.	894	*Clematis grata* Wall.	Zelai, Chenjanwala	Sheringal, Shahoor, Dogdara	Leaves	Rheumatism, bone disorders, and chronic skin conditions and as a diuretic
17.	904	*Clematis orientalis* L.	Zelai	Ganshal, Shahoor, Dogdara	Leaves	Orally to treat syphilis, gout, rheumatism,
18.	1011	*Clematis buchananiana DC*	Zelai	Sia sheringal, Shahoor, Dogdara	Leaves	poultice to treat swellings caused by inflammation
19.	845	*Delphinium denudatum* Wall. ex Hk. & Thoms.	Da kono zaila	Thall, Shahoor, Dogdara, Sheringal	Root, Areal Part	cough, cold, asthma and respiratory disorders
20.	913	*Delphinium roylei* Munz	Oudi Gulae	Nabalbanda, Shahoor, Dogdara	Root and Areal Part	Insecticide and treatment of skin eruptions
21.	923	*Delphinium himalayai* Munz.	Jadwar	Kumrat (New reported)	Root and areal Part	Not found any use
22.	951	*Delpinium uncinatum* Hk. f. & T.	Jadwar	Sheringal, Dogdara, Sheringal	Root and areal Part	Not found any use
23.	58	*Nigella sativa* L.	Kalwangai	Cultivated	Seed	liver tonics, diuretics, digestive, anti-diarrheal, appetite stimulant, analgesics, anti-bacterial and in skin disorders
24.	961	*Ranunculus arvensis* L.	Ziarr Gulay	Sheringal, Shahoor , Dogdara	Whole Plant	Arthritis, asthma, hay fever, rheumatism, psoriasis and gut diseases
25.	855	*Ranunculus chaerophyllos* L.	Zergulay	Gujarokus, Shahoor, Dogdara	Nil	Not found any activity
26.	806	*Ranunculus diffusus* DC.	Zergulay	Patrak, Shahoor, Dogdara, Sheringal	Whole Plant	Anti-rheumatism, intermittent fever and rubefacient
27.	816	*Ranunculus hirtellus* Royle	Hair botaey	Sheringal, Shahoor, Dogdara	Nil	Not found any use
28.	865	*Ranunculus laetus* Wall. Ex Hk. F. & Thoms.	Zergulay	Samang, Shahoor, Dogdara	Whole Plant	Anti-inflammatory, analgesic, sedative and expectorant
29.	994	*Ranunculus muricatus* L.	Ziarr Gulay Quazi Ban	Sia Sheringal, Shahoor, Dogdara	Whole Plant	Fevers, gout and asthma
30.	914	*Ranunculus pulchellus* C.A. Mey.	Zergulay	Samang, Shahoor , Dogdara	Whole Plant	Rheumatic, painful joints
31.	875	*Ranunculus sceleratus* L.	Zear gulae	Shahoor, Dogdara, Sheringal	Whole Plant	Anti-inflammatory, analgesic, sedative and expectorant
32.	826	*Thalictrum foliolosum* DC.	Kamasla mammera	Kumrat, Shahoor, Dogdara	Whole Plant	peptic ulcers, indigestion, fevers, toothache, haemorrhoids

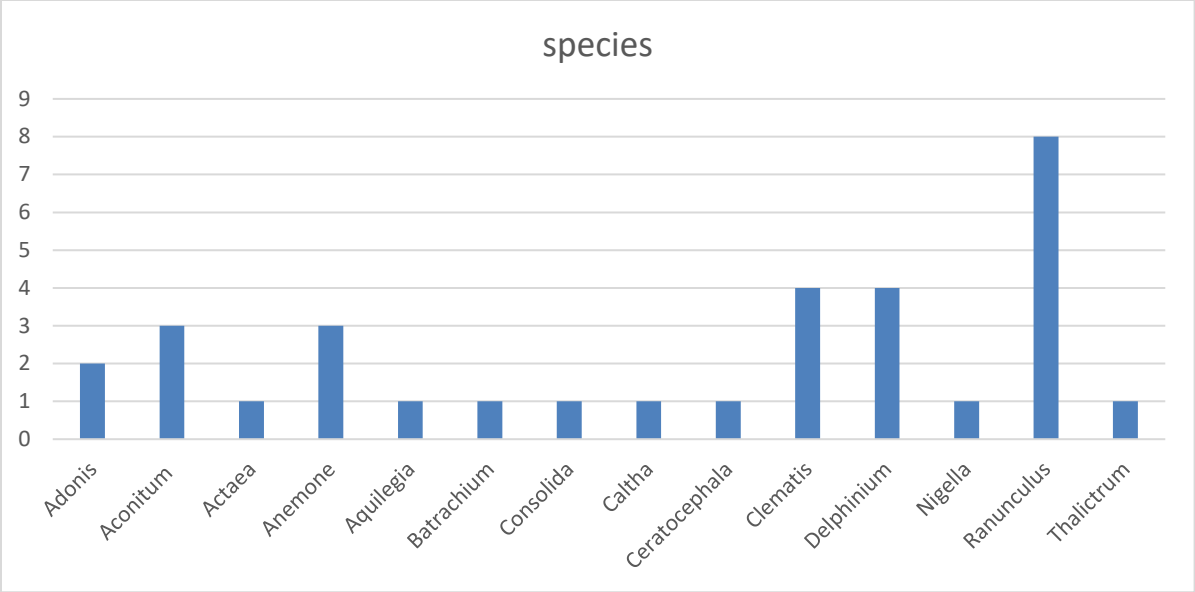

Figure 1: Number of genera and species

Key to the genera

1. Flowers zygomorphic----------2
\+ Flowers regular (actinomorphic) ----------4
2. Flowers without a spur. Upper sepal hood-like----------*Aconitum*
\+ Flower upper sepal with a distinct spur----------3
3. Perennials. Follicles 2-5----------*Delphinium*
\+ Annuals. Follicles single----------*Consolida*
4. Sepals and petals a distinct spur---------- *Aquilegia*
\+ Sepals and petals without spur----------5
5. Fruit a berry---------- ---------- *Actaea*
\+ Fruit not a berry----------.6
6. Fruit 2-many seeded follicles----------7
\+ Fruit 1-seeded achene----------8
7. Leaves undivided, roundish, dentate to crenate----------*Caltha*
\+ Leaves divided in various ways----------*Nigella*
8. Woody or herbaceous climbers----------*Clematis*
\+ Woody not nor climbers ----------9
9. Flower color white ---------- *Thalictrum*
\+ Flower color otherwise ---------- 10
10 Plant perennial---------- 12
\+ Plant annuals----------11
11 Carpels rugose with prominent veins ---------- *Adonis*
\+ Carpels without prominent veins----------*Ranunculus*
12 Flowers 1-2 or in an umbel-l ike inflorescence----------*Anemone*
\+ Flower not as above----------13
13 Floating aquatic herbs, the submerged leaves with filiform leaf-segments ---------- *Batrachium*
\+ Non floating aquatic herbs but sometimes with flaccid, creeping stems on wet ground -------- ----------
---------- *Ceratocephala*

Genus: *Aconitum* L., Sp. Pl. 523. 1753.

Key to the species

1 Helmet of flower longer, than wide or base abruptly widened base----------*Aconitum laeve*
+ Helmet as wide, as long base not abruptly widened---------- 2
2 All or most of the leaves, undivided sometimes deeply lobe----------*Aconitum heterophyllum*
+ All the leaves palmately, partite for more than half their diameter---------- *Aconitum violaceum*

Genus: *Delphinium* L., Sp. Pl. 530. 1753.

1 Roots tuber form flowers usually comparatively small, often clustered in dense racemes
2 on short pedicels ----------2
+ Roots ± slender, cylindrical, rhizome-like. Flowers usually larger, on longer pedicels----------
----------*Delphinium denudatum*
3 Spur definitely longer than lamina of upper sepal----------*Delphinium himalayai*
+ Spur not definitely longer than lamina of upper sepal----------3
4 Pedicels with spreading hairs. Spur forming a terminal hook----------*Delphinium uncinatum*
+ Pedicels with appressed hairs. Spur not forming a hook----------*Delphinium roylei*

Genus: *Clematis* L., Sp. Pl. 543. 1753.

Key to the species

1 Leaflets linear-lanceolate to narrowly ovate, never cordate at base, sometimes distinctly lobed with entire lobe----------*Clematis orientalis*
+ Leaflets with cordate base or widely ovate, grossly dentate, rarely entire or lobed with a few grossly dentate lobes ----------2
2. Sepals 6-8 mm long, horizontally spreading----------*Clematis grata*
+ Sepals 10-20 mm long-erect, curved backwards at the tips----------3
3 Sepals with parallel ribs, 15-20 mm long----------*Clematis buchananiana*
+ Sepals without ribs, 10-12 mm long----------*Clematis aspleniifolia*

Genus: *Adonis* L., Sp. Pl. ed. 2:771. 1762.

Key to the species

1 Flowers upto 25 mm in diameter, usually red with a dark center----------*Adonis aestivalis*
+ Flowers upto 16 mm in diameter, usually yellow, ----------*Adonis dentatus*

Genus: *Ranunculus* L., Sp. Pl. 548. 1753.

Key to the species

1 Plants annual, rarely biennial ----------2
+ Plants perennial----------4
2 Carpels, 4-6 mm long----------3
+ Carpels, 1-3 mm long----------*Ranunculus sceleratus*
3 Calyx reflexed----------*Ranunculus muricatus*
+ Calyx not reflexed----------*Ranunculus arvensis*
4 All upper leaves entire or apically cuneate with a few teeth, lanceolate ----------5
+ All the leaves more or less deeply tripartite to palmatipartite ----------6
5 Leaves with long, soft, appressed hairs----------*Ranunculus membranaceus*
+ Leaves glabrous, not with long, soft, appressed hairs----------*Ranunculus pulchellus*
6 Achenes with a distinct margin ----------7
+ Achenes without a distinct margin----------*Ranunculus hirtellus*
7 Stems flaccid, sometimes rooting at nodes----------*Ranunculus diffusus*
+ Stems never flaccid nor rooting at nodes----------8
8 Root-stock woody, elongate----------*Ranunculus laetus*
+ Root-stock not elongate and woody----------*Ranunculus chaerophyllos*

Genus: *Anemone* Camb.(Bot.) 5.t.2. 1835.

Key to the species

1 Achenes embedded in dense wool. ---------- *Anemone rupicola*

+ Achenes not embedded in dense woo----------2
2 Leaves of involucre trifid---------- *Anemone obtusiloba*
+ Leaves of involucre entire----------*Anemone falconeri*

CONCLUSION

The origin of angiosperms has long been a questionable among botanists of Pakistan. One point of controversy has the primitive angiospermic flower. In this study looking to the controversy, should be taken in mind to solve this problems about the Ranunculaceae and identify the relationship among species of the family with the help of morphological key characters and related with other families..

CONFLICT OF INTEREST

The authors declared that present study was performed in absence of any conflict of interest.

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AUTHOR CONTRIBUTIONS

AH and KS designed and performed the experiments and also wrote the manuscript, GR and JZ identified the plants, MM, ZA and ZF help in collection and ethnobotany survey, SB, and AH help in mounting on herbarium sheets AU and MN data analysis and reviewed the manuscript. All authors read and approved the final version.

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