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REVIEW ARTICLE

Ethno-pharmacological review of genus Primula

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Abstract

Primula is a large genus of perennial herbs comprising of 430–500 species growing in the humid and moderate climatic regions of the Northern Hemisphere. Different plant species of the genus Primula have been used from times immemorial to treat various ailments and phytochemical investigation on various species revealed presence of various phytochemicals considered as a source of medicinal agents. This review on the genus covers its distribution, traditional uses and phytochemical uses of its different species.

INTRODUCTION

Distribution

The family Primulaceae, consists of 22 genera and 1000 species (Yasin, 1983). Taxonomically, Melchior (1961), divided the family into five sub families (based on morphological characters such as floral symmetry, position of ovary and aestivation of corolla) with 19 genera and about 924 species (Table 1).

Primula is a large genus of perennial herbs comprising of 430–500 species growing in the humid and moderate climatic regions of the Northern Hemisphere (Richards, 2003). About 75% of these species are dominantly distributed in the Himalayan mountain chain and western China, with a few species distributed in the mountains of Africa (Ethiopia), Tropical Asia (Java and Sumatra Islands), and South America (Richards, 2003). The first account on Primula was compiled by Linnaeus during 1753 after fairly investigating its taxonomy. Ghosh (1978), after critically studying the material on the genus Primula mostly based on different Herbaria studies (particularly Indian herbaria) and available literature with special reference to monographs published by Flitcher (1953), revealed that Eastern Himalaya is the chief abode of genus Primula excluding Nepal. Hooker (1882), in his "Flora of British India", recognized 43 species on the basis of their leaf characters, venation, inflorescence and the flower characteristics, of which majority of the species are distributed in eastern India mainly confined to Sikkim, Bhutan and Khasia hills of Assam (Table 2).

Traditional and pharmacological uses of primula

Different plant species of the genus have been used from times immemorial by the inhabitants of Greece as antidote to snake poison and their juice was applied to relieve toothache (Dymock, 1890). Some species of the genus are used traditionally to treat epilepsy and convulsions (Jager et al., 2006). Different species of the genus promote functioning of liver and spleen and remove obstructions of these organs, their constituents have been prescribed to relieve pain of kidneys, used to cure boils, scorpion strings and are also used as sedative (Saqib, 1980). Dymock (1890), reported that some species have mild narcotic action. Primula macrophylla is reported to be useful in treatment of asthma, restlessness, insomnia and fish poisoning (Saqib et al., 2009). In Tibetan traditional therapy

system, Amchis use whole plant of Primula macrophylla for food poisoning, fever, indigestion, dysentery, ulcer etc and flower of Primula sikkimensis for blood vein disorders in case of children (Pandey, 2006). An ethno botanical investigation of west Himalaya, India described P.denticulata a religious plant (Shreekar et al., 2010). Hassan (2010), reported that infusion form young stem of plant base is used to improve eye sight and control ophthalmia.

Phytochemical investigation on various species of genus revealed that triterpenoids, phenolics and flovonoids are widely distributed in the genus and many species have a farinose coating on leaves and inflorescence which possesses flovonoid aglycones with a remarkable low degree of oxygenation and sensitizing properties (Engasser, 1992 and Wollenweber et al., 1990). In some species of genus glandular hairs produce phenols and quinones of which primin and miconidin are major constituents (Horper et al., 1995) in which cytotoxic activity was detected (Weeks et al., 1977). Triterpenes, mostly saponins have also been found in many species which could be of chemotaxonomic and pharmacological importance (Chandel et al., 1980). Primula saponins irritate locally the gastric mucosa, which provokes a reflex, increase in bronchial secretion, and subsequently dilutes the mucus and reduces its viscosity (Saqib et al., 2009) and this irritation of mucous membranes in the throat and respiratory tract by saponins may also cause an increase in bronchial secretion. The farinose leaf exudates of Primula species consists of a number of flavones with different biological activities and possesses various flavonoids that possessed strong cytostatic properties against HL 60 cells even at low concentrations (Tokalova et al., 2004). Pharmacological studies indicate that the extracts of genus Primula are rich in saponins and phenolic glycosides (Gamze et al., 2008). Primula veris is an effective ABTS (2-azino-bis3-ethylbenzthiazoline-6-sulfonic acid), DPPH (1,1-diphenyl-2-picryl-hydrazyl) free radical and superoxide anion radical scavenger, and has total reducing power and metal chelating activities on ferrous ions activities (Demr et al., 2009). Many of the flavonoids from the genus have cytostatic properties (Tokalov et al., 2004) and many induce apoptosis (Plaumann et al., 1996). Investigation conducted by Heshmatollah et al., (2011) on Primula heterochroma to determine amount of protective effect of polyphenolic flavonoid extracts showed good results. Primula macrophylla possess antileishmanial activity, cytotoxic activity and antifungal activity which is due to presence of flavone compound i.e. 2-phenylchromone (Saqib et al., 2009).

The biological effects of epicuticular substances in farinose exudates accumulated on inflorescence shafts and calyces on human acute myeloid leukemia cells (HL-60) were analyzed and results reveal that crude material of Primula denticulata possessed antioxidative as well as strong cytostatic properties (Tokalova et al., 2003). Primetin (5, 8-dihydroxyflavone) isolated from P. mistassinica posses strong sensitizing properties. The same substance has been detected in several other Primula species such as P. auricula, P. halleri, P. malacoides, P.marginata, and P. denticulata (Wollenweber, 1984). Primetin 19 (5, 8-dihydoxyflavone), a constituent of Primula denticulata (Indian anti-snake venom plant), occurs in a farinaceous coating, a powerful contact allergen which covers these plants (Harborne, 1971). Roots and rhizomes of various Primula sp. contain triterpene saponins, mainly primulasaponin A (primula acid), primula saponin B, as well as the phenolic glycosides i.e. primulaveroside and primveroside and primula flowers contains triterpene saponins, phenolic glycosides, and 3, 4, 5-trimethoxyflavone (Huck et al., 1999) used for various pharmacological activities. Quercetin and its derivatives- kaempferol, and 3-limocitrin glucoside are used for the pharmaceutical industry (Harborne, 1993). Similar flavonoids, with the exception of methoxyflavones, as well as 3, 4-dihydroxyflavonglucoside were detected in leaves of P. veris (Harborne, 1993). Leaves of various species of the genus when used with cold cream preserves the complexion, hinder wrinkles and also possesses dermatitis activity which is due to secretion of primin from the glandular hairs on the leaves of Primula sp. (Saqib, 1980). Extracts of Primula denticulata are effective in treating acne and reducing oil pores on skin (Claude et al., 2008).

DISCUSSION

Different plant species of the genus have been used traditionally from times immemorial for various medicinal purposes. Phytochemical investigation on various species of genus revealed that triterpenoids, phenolics and flovonoids are widely distributed in the genus and many species have a farinose coating on leaves and inflorescence which possesses flavonoid aglycones with remarkable biological activities. Although the genus consists of almost 500 species predominantly distributed in the Himalayan mountain chain and western China, but only few species have been investigated for phytochemical studies as apparent from examination of review of literature during the present study.

CONCLUSION

Ethnomedical and phytochemical literatures about the medicinal properties of genus represents it a very effective and safe genus for medicinal uses. By using various pharmacological approaches in natural drug discovery, potent

and safe drugs can be investigated from different species of the genus for various chronic diseases like liver diseases, cancer, arthritis, and other inflammatory diseases due to presence of various novel compounds.

Table 1: Systematic classification of Primulaceae

Family	Sub-family with its diagnostic character	Genus	No. of species
Primulaceae	**Primuleae** (superior ovary, corolla lobes imbricate in the bud, capsule with valvate dehiscence)	Androsace Aradisiandra Cortusa Dionysia Dodecantheon Hottonia Omphalogramma Primula Bryocarpum Douglasia	120 3 7 40 50 3 13 425 6 8
	Cyclameneae (superior ovary, reflexed petals, capsule with valvate dehiscence)	Cyclamen	20
	Lysimachieae	Asterolinum Glaux Lysimachia Pelletiera Steironema Trientalis	2 1 200 1 4 4
	Samoleae (semi inferior ovary)	Samolus	10-15
	Corideae (spiny calyx and irregular flowers)	Coris	2

(Compiled from Melchior, 1961)

Table 2: Distribution of various species of genus Primula in west Asia

S.No	Species	Distribution
1.	Primula. rotundifolia	Temperate Himalaya (Kashmir-Sikkim)
2.	P. gambeliana	Sikkim Himalaya (Jongri)
3.	P. pulchra	Sikkim Himalaya (Lachen)
4.	P. vaginata	Sikkim Himalaya (Laghep)
5.	P. clarkii	Kashmir
6.	P. mollis	Eastern Himalaya (Bhutan)
7.	P. geranifolia	Eastern Tibet (Chumbi valley)
8.	P. filipes	Bhutan

9.	P. listeri	Sikkim Himalaya (Tonglo and Singhalela ranges)
10.	P. denticulata	Temperate Himalaya (Kashmir-Bhutan)
11.	P. capitata	Sikkim and Bhutan Himalaya
12.	P. erosea	Temperate Himalaya (Kumaon-Bhutan)
13.	P. bellidifolia	Sikkim Himalya
14.	P. farinosa	Western Tibet
15.	P. heydei	Western Himalaya
16.	P. concinna	Sikkim Himalaya (Tibetian Passes)
17.	P. glabra	Sikkim Himalaya, Zanskar, Lahul
18.	P. sibirica	Western Tibet
19.	P. involucrata	Alpine Himalaya (Kashmir-Sikkim, Western Tibet)
20.	P. tibetica	Western Himalaya (Kumaon,Tibet,Sikkim frontier)
21.	P. elliptica	Western Himalaya (Kashmir-Lahul)
22.	P. prolifera	Khasia Hills
23.	P. rosea	Western Himalaya (Kulu –Kashmir)
24.	P. obtusifolia	Western and Eastern Himalaya
25.	P. elongata	Sikkim Himalaya (Zemu valley)
26.	P. stuartii	Subalpine and Alpine Himalaya and Tibet
27.	P. sikkimeensis	Sikkim Himalaya
28.	P. kingli	Sikkim Himalaya (Natong)
29.	P. dickiena	Sikkim Himalaya (Lachen)
30.	P. elwesiana	Sikkim Himalaya
31.	P. tenella	Eastern Tibet (Chumbi valley)
32.	P. pusilla	Central and Eastern Himalaya (Nepal,Sikkim)
33.	P. sappihirina	Sikkim Himalaya
34.	P. uniflora	Sikkim Himalaya (Kankola pass)
35.	P. soldanelloid	Sikkim Himalaya (Kankola pass)
36.	P. petiolaris	Temperate (Simla-Bhutan)
37.	P. minutissima	Alpine Himalaya (Kashmir-Kumaon)
38.	P. reptans	Western Himalaya (Kashmir,Burjila)
39.	P. hookeri	Sikkim Himalaya (Laeben)
40.	P. muscoids	Sikkim Himalaya (kankola pass)
41.	P. stirtoniana	Sikkim Himalaya (Kanglanamo)
42.	P. floribunda	Western Himalaya (Kumaon-Kashmir)
43.	P. reticulata	Central and Eastern Himalaya (Nepal,Sikkim)

Compiled from Bentham and Hooker, (1882)

REFRENCES

Chandel, R.S. and Rastogi, R.P. (1980): Triterpenoid saponins and triterpenoid sapogenins. Phytochemical., 19: 1889-1908.

Claude, S., Sekhar. B., Khalid, M., Michael, A. and Kelly, H. (2008): Compositions containing an extract of a Primula denticulata and use thereof.

Demr, N., Nadaroglu, H. and Demr, Y. (2009): The antioxidant and radical scavenging activities of cowslip (Primula veris). Phytopharmacology and Therapeutic Values., 157-170.

Dymock, W., Warden, C.J. and Hand Hooper, D. (1890): Pharmacographical Indica., 451. Published by Thacker Spink and company, Calcutta. Reprinted by Hamdard Institute of Health and Tibbi (Medical) Research Karachi, 1972.

Engasser, P.G. (1995): Primin free Primula obonica seeds are available. Contact derma., 6: 252.

Flitcher, H.R. (1953): Some recent primula introductions. Ibid., 78: 18-26.

Gamze, B., Bulbull., Ozmen, A., Halil, H. and Ozge. (2008): Antimitotic and antibacterial effects of the Primula veris flower extracts. Caryologia., 61: 88-91.

Ghosh, R.B. (1978): An analysis on the distribution of de Indian taxa of the genus Primula Linn., in the Eastern Himalaya with remarks on the species of Assam. Central national herbarium Calcutta, India.

Harborne, J.B. (1971): Primulaceae Hirsutin and Gossypetin in Dionysia. Phytochemishtry., 10: 472.

Harborne, J.B. and Baxter, H. (1993): Phytochemical dictionary. A handbook of bioactive compounds from plants, 683. Taylor and Francis, London.

Hassan, S. and Mohammad, A. (2010): Economically and ecologically important plant communities in high altitude coniferous forest of Malam Jabba, Swat, Pakistan. Saudi Journal of Biological Sciences., 18: 53-61.

Heshmatollah, A., Mahboobeh, Z., Seyed, F.N., Alireza, N and Seyed, M.N. (2011): Assessing the protective effect of Primula heterochroma extracts against Sodium fluoride-Induced hemolysis in rat erythrocytes research report. Fluoride., 44: 238–242.

Hooker, J. D. (1882): The flora of British India. 3: Reeve and co., London.

Huck, C.W., Huber, C.G.L., Ongania, K., Scherz, H., Bonn, G.K. and Popp, M. (1999): Isolation and structural elucidation of 3′,4′,5′-trimethoxyflavone from the flowers of Primula veris. Planta Medica., 65: 491.

Jager, A. K., Gauguyn, B., Adsersen, A. and Gudyksen, L. (2006): Screening of plants used in Danish folk medicine to treat epilepsy and convulsions. Journal of Etnopharmacology., 105: 294-300.

Melchior, H. (1961): Primulales. In Melchior, H. (ed.) Syllabus der Pflanzenfamilien. Borntriiger., 2: 389-394.

Pandey, M.R. (2006): Use of Medicinal Plants in Traditional Tibetan Therapy System in Upper Mustang, Nepal. Our Nature., 4: 69-82.

Plaumann, B., Fritsche, M., Rimpler, H., Brandner, G and Hess, R. D. (1996): Flavonoids activate wild-type p53. Oncogene., **13**: 1605-1614.

Richards, J. (2003): Primula Second Ed. Portland, OR, USA: Timber Press

Saqib, N. (1980): Phytochemical studies of some Primulaceous and leguminous plants. P.hD. Thesis, university of Karachi, 4-6.

Saqib, N., Alam, F. and Ahmad, M. (2009): Antimicrobial and cytotoxicity activities of the medicinal plant Primula macrophylla. J Enzyme Inhib Med Chem., 24: 697-701.

Shreekar, P. and Samant, S.S. (2010): Ethnobotanical observations in the mornaula reserve forest of Kumoun west Himalaya India. Ethnobotanical Leaflets., 14: 193-217.

Tokalova, S.V., Kynd, B., Wollenweber, E. and Gutzeyt, H.E. (2004): Biological effects of epicuticular flavonoids from Primula denticulata on Human Leukemia Cells. J.Agric. Food Chem., 52: 239-245.

Weeks, R.A., Dobberstein, R.H and Farnsworth, N.R. (1977): Isolation of paeonol from Bathysa miridionales. J. Nat. Prod., 40: 515.

Wollenweber, E., Rodriguez, E., Healey, P.L. and Metha, I. (1984): The systematic implication of flovonoids secreted by plants in biology and chemistry of plant trichomes. Eds plenum press, Newyork., **53.**

Yasin, J.N. (1983): A revision of the family Primulaceae from Pakistan. Ph.D. Thesis. Department of Botany, Karachi.1.