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Phytochemical analysis and pharmacological applications of *Berberis lycium*

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Abstract
All the bioactive compounds detected or isolated from the root extract of *Berberis lycium* were present in the plant, and not by the interaction of plant material with any solvent or through any chemical occurring while extraction or isolation of the plant components. Roots of *Berberis lycium* showed the presence of alkaloids, terpenoids, tannins, saponins, reducing sugar as major secondary metabolites. The presence of diarylheptanoids in roots was shown by Mansi Gupta (name of the paper). No such diarylheptanoids were observed in the roots of *Berberis lycium* in the given study. *Berberis lycium* contain variety of phytochemicals like steroids, flavonoids, alkaloids, tannins, anthoquinonine, Terpenoids, proteins, and carbohydrates. Ikram *et al* 2008 isolated many phytochemicals from plants like Barberine, Berbericine hydrochloride, Berberine chloride, Berberine –chloroform, chenabine, diphenolic, palmatine, Jhelumine, Karakoramine, palmitive chloroform along with oxyberberine, punjabine, seco-bisbenzylisoquinoline, sindamine, umbellatine, etc.

Keywords: Phytochemicals, pharmacological applications, *Berberis lyceum* etc.

Introduction
Nature has solutions to every human problem. During the long run of survival of human species, throughout the centuries, prevention and cure from deadly diseases, infections and aliments was second top need prior to food and water. Earlier most of the medications and remedies was plant based. The use of plants for medicinal purposes is as old as our civilization. Whether it was traditional Arabic and Islamic Medicine (TAIM), Traditional Chinese Medicine (TCM) practices or Indian Ayurveda, plants have played a vital role in medicinal uses far before medicines and drugs came into existence. India used some of the oldest yet effective medical systems like Ayurveda and Unani (3000BC). The material medica of these systems provide a rich heritage of indigenous herbal practices that have helped to sustain the health of most rural people in India. The books on Ayurveda and medicinal uses of plants such as Charaka Samhita and Susruta Samhita refers to the use of more than 700 herbs (Jain 1968). Other written record mentioning the curative use of plants was Sumerian herbal (2200 BC).

Berberis lycium
Berberis lycium is an important medicinal plant with medicinal rating 3(1 to 5) Nadkarni, 1992; Momin 1987; Grover *et al* 2000. It belongs to the genus *Berberis* and family Berberidacae. This family is represented by around 12 genera and 600 species (Rao *et al*., 1998). Among all the genera's *Berberis* is the major group with around 500 species. (Bhardwaj & Kaushik; 2013)

Occurrence: The plant is generally found in Himalayan regions of India, Pakistan and some part of Nepal.

Nomenclature: The plant is known as "Kimal" in the local area of extraction that is in Doda area of J&K, India. Apart from this the commonly used names of this plant are:

English : Indian Barberry
Hindi : Kashmal or Kasmal
Urdu : Ishkeen

Taxonomical classification

Kingdom	:	Plantae
Division	:	Magnoliophyta
Class	:	Magnaliopsida
Family	:	Berberidaceae
Genus	:	*Berberis*
Species	:	lycium

Phytochemistry

Phytochemistry is the branch of chemistry that deals with the study of phytochemicals. It can be considered as abridging branch between botany and chemistry. This branch investigates the structures, function pharmacological activities of phytochemicals and their synthesis for further use. Phytochemistry thus revolves around the investigation of phytochemicals.

Phytochemistry deals with the methods of extraction, separation, purification and identification of different constituents present in the plant; thus it involves the exploration of old and new advanced techniques to understand the nature and functions of the active compounds present in the plant.

Phytochemical analysis begins with the extraction of phytochemicals or in common language we can say the digging out of the constituents present in the plants. To extract the constituents from the plant material a researcher has to make sure that the constituents are not destroyed or disintegrated while the extraction process and can be isolated easily from plant extract. There are various standard methods to carefully extract the constituents depending upon the nature of plant and the part of the plant utilized. Generally the plant part to be extracted is separated carefully from plant and dried for 72 hours in shady area in sunlight. After it is dried it is crushed into powdered form, further the powdered material is dissolved into appropriate solvents and thus a plant extract is formed which is labeled and taken to laboratory for further investigations. Alcohol is widely used as a solvent for the initial extraction processes. Polarity of the solute is kept in mind while choosing the solvents used for extraction of bio molecules. Polarity order of some of the commonly used solvents in order of increasing polarity is given below:

Hexane< Chloroform< Ethyl acetate< Acetone< Methanol< Water

Material and Methods

General laborartory and aseptic techniques as described in Dodds and Roberts (1984) were followed. Aseptic techniques were carried out in a Laminar Air Flow Bench (Klenzaids, India) equipped with a germicidal UV lamp.

Clean glassware of Corning or Borosil brands were used. They were washed in acidified dichromate, detergent and in running tap water. Glassware were rinsed in distilled water and dried before use. Pre- sterlised plastic were used in this study from Tarsons (India), Laxbro (India) and Falcon(USA) brands.

Distilled water of reagent grade was used for the preparation of all the solutions and reagents.

Laboratory grade chemicals from Glaxo or SDS (India) were used for preparation of tissue culture media. Analytical grade chemicals were used for preparation of reagents and solutions. Salts were weighed using a monopan balance (Sartorious, Germany).

The medicinal shrub used in this study is *Berberis lycium*. The root samples of the plant were collected in good condition, without any mechanical, biological or microbiological damage from the Chiralla area of Doda district, Jammu and Kashmir, India in July and August months of 2019.

Phytochemical Analysis

Extraction of sample tissues

After the collection of plant material the next step that was followed was to preserve the collected material and extract sample tissues from the plant material for further experimental uses. Extraction procedures were generally followed according to the literature (Cannell, 1998). The plant material was spread on tarpaulin or cloth sheet and dried in open air with approximately 40 degree temperature under shade to avoid direct sunlight. Shade dried and powdered plant samples were used for solvent extraction. One Kg of the powdered material was extracted in n- hexane ($3\times 3L$) and the marc was air dried and re-extracted exhaustively in methanol (3×5L). Methanol extract was vacuum evaporated to yield 403 gm of residue. The residue from methanolic extract was partitioned with n- butanol: water (1:1) (2×1L) and the n-butanol extract yielded 96gm of residue on flash evaporation.

Observation and Result

The phytochemical analysis of *Berberis lycium* was conducted and the results observed are presented in tabular form;

Table 1: Observation

Phytochemical	Test Used	Observation	Inference
Alkaloid	Wagner's test	Brown flocculants precipitate observed	Present
Terpenoid	TLC	Colored spots of monoterpens	Present
Saponins	Froth formation method	Emulsion is formed	Present
Phenolic Acid	Chromatographic method	Minute color change	Present
Flavonoids	NaOH test	Yellow color appeared	Present
Tannins	Ferric chloride test	Blue black color observed	Present
Glycoside	Fehling's test	Red precipitates formed	Present
Reducing sugar	HCL test	Brown solution is formed	Present
Steroids	Chloroform test	Color changed from violet to green	Present
Amino Acids	Thin layer chromatography	Violet purple color observed	Present

The extract of *Berberis lycium* root showed the presence of the phytochemicals like alkaloids, glycosides, phenolics, saponins, tannins, flavonoids, terpenoids etc.

Apart from these diheptanoids were present in very low negligible quantity.

Conclusion

In the area of extraction of plant, *Berberis lycium* is used by locals for many medicinal purposes like, common cold, cough, eye complaints, chronic diarrhoea, jaundice etc. Apart from this some of them use it curing early stage diabetics. *Berberis lycium* is a versatile shrub with lots of medicinal properties which are detected shown by many researchers from time to time.

The leaves are used in treatment of jaundice, in addition to that Rhizome of *Berberis* species have antibacterial effects, oral treatment of it is used for various enteric infections especially bacterial dysentery (Duke *et al*. 1985). The different parts of the plant are known to prevent eye disorders, abdominal disorders, skin diseases etc (Mansi Gupta 2015).

Plant is extensively used in local practices for the treatment of several human diseases like piles, menorrhagia, jaundice, wounds and broken bones (Singh SK &Rawat GC 2000).

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