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## **Original Research Paper**

### **PHYTOCHEMICAL AND PHARMACOLOGICAL SCREENING OF ANTI-INFLAMMATORY ACTIVITY OF *BERBERIS LYCIUM* ROOT EXTRACT**

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#### **ABSTRACT**

*Berberis lyceum* is also known as Indian Barberry. It is a rapidly growing herb mainly distributed in India and Pakistan. In traditional system of medicine, the plant is used for various affliction and diseases. The different parts of the plant like leaves, stem, root, fruits and flowers are used by the people as medicines and food. The plant is known to prevent eye disorders, abdominal disorders, skin diseases etc. Pharmacological investigation has shown that it exhibits antibacterial property, antidiabetic property and cardiac diseases. The Present review article overview the phytochemical and pharmacological properties of the plant and in this article attempt has been made to summarize the anti-inflammatory property of the plant.

**Keywords:** Berberidaceae, Barberry, Berberine, Phytochemical, Anti-inflammatory Activity.

#### **INTRODUCTION**

Inflammation is a disorder that affects a wide range of people throughout the world. This herb has been used for many years for gallstones and gall bladder infections and may improve the symptoms of jaundice. It is indicated in congestive jaundice, inflammation of the gall bladder and gallstones. Barberry is capable of similar action to metronidazole, a common antiprotozoal medication, but has the advantage of no side effects. External application of barberry has been recommended to reduce the inflammation and pain of bruises, aches, and sprains.<sup>2</sup> Numerous traditionally used plants exhibit pharmacological properties with great potential for therapeutic applications in the treatment of inflammation disorders. *Berberis lyceum* is an evergreen shrub belongs to family Berberidaceae. It is also known as Indian berberry in English, *kashmal* or *kasmal* in Hindi and *Ishkeen* in Urdu. It is a suberect, rigid, spiny shrub 2.7- 3.6 ml in height. The genus *Berberis* is widely distributed in America, Europe and Asia. It is well known medicinal plant with overall

edibility rating 3 (1-5 scale) and medicinal rating 3 (1-5 scale). Every part of this plant has some medicinal value. Its root, bark, stem and fruits are used in various *ayurvedic* preparations. It is extensively used for the treatment of various diseases like liver disorders, abdominal disorders, skin diseases, cough, diabetes mellitus etc. Based on literature search, no study has been carried out to scientifically validate the anti-inflammatory activity of *Berberis lycium* royal. Hence the study was carried out to investigate the anti-inflammatory effect of *Berberis lycium* in rats.<sup>3</sup>

#### **MATERIALS AND METHODS**

##### **Plant Material**

##### **Collection and Authentication of plant materials**

Root parts of the plant *Berberis lycium* were collected from the solan region and authenticated by Dr. R.S. Raina, Dr. Y.S Parmar University of horticulture and forestry nauni (H.P.).

##### **Processing of Sample**

The roots were collected, cleaned thoroughly with distilled water and the desired plant parts were dried under shade for 10 to 15 days. The shade dried roots were pulverized in a mechanical grinder to obtain coarse powder.

### **Preparation of Extracts**

The powdered root were subjected to extraction by Soxhlet method using methyl alcohol as solvent. Evaporation of solvent from the extract was done by distillation method. A semisolid extract was obtained after evaporation of solvent. The samples were stored at 10°C till further use. At the time of administration a suspension was prepared by using the extract in 1% w/v of Sodium carboxymethyl cellulose (sodium CMC).<sup>4</sup>

### **Phytochemical Analysis**

#### **Methanolic extract of *Berberis lycium***

Methanolic extract of *Berberis lycium* were subjected to Preliminary Phytochemical screening.<sup>5</sup>

### **Experimental Animals**

Wistar albino rats of both sexes weighing between 100-250g were obtained and kept at the Laboratory Animal centre of the college. The animals maintained under standard environmental conditions had free access to standard diet and water ad libitum. Rats were housed in groups of six per cage. All the animals were maintained under standard conditions; that is room temperature 26±1°C, relative humidity 45-55% and 12:12 hrs light-dark cycle. The cages were maintained clean, and all experiments were conducted between 9 am and 4 pm.

### **Acute toxicity study**

Swiss Albino Mice of either sex (20 - 25 g weight) were used for acute oral toxicity study. The study was carried out as per the guidelines set by OECD 423 and animals were observed for mortality.<sup>6</sup>

### **Ethical approval**

The experimental protocols were approved by the Institutional Animal Ethics Committee (IAEC) and all the experiments were conducted according to the guidelines of Committee for the Purpose of

Control and Supervision of Experiments on Animals (CPCSEA).

### **Drugs and Chemicals**

Methanol, Normal Saline, Diclofenac, Carrageenan.

### **Phytochemical Constituents**

*Berberis lycium* is one of the plant species being abundantly available, the whole plant especially root is extensively used for the treatment of several human diseases under local practices in Pakistan. The various chemical constituent of *Berberis lycium* are berberine, berbamine, chinabine, karakoramine, palmatine balauchistanamine, gilgitine, jhelumine, punjabine, sindamine, chinabine acetic acid, maleic acid, ascorbic acid.<sup>7</sup> The plant contains major alkaloid berberine which is an isoquinoline alkaloid and umbellitine. This is usually taken from root or root bark of the *Berberis lycium*, and other Berberis species abundantly available in local forests. The fruits contain malic, tartaric, citric acids and tannins.<sup>8</sup>

### **Nutritional Composition**

The root of this plant is one of the few really good medicines of India. The watery extract from the root is used in the treatment of ophthalmia (swollen and sore eyes) by local person 15 and for treating jaundice. Powdered root bark mixed with mustard oil is used for massaging broken bones. They are also used as a remedy for wounds, gonorrhea, curative piles, unhealthy ulcers, acute conjunctive. It is also used as bitter tonic astringent, diaphoretic and febrifuge. The dried root extract is also an excellent medication against sun blindness. A crude extract is also prepared from roots by boiling crushed root, root bark and lower stem wood with water (and milk) followed by straining and concentrating to a dark brown sticky mass called as rasout. *Rasaut* is fairly soluble in water. It is mixed with butter and alum, or with opium and lime-juice and is applied externally to the eyelids to cure ophthalmia and other eye diseases. It is also used for the treatment of fevers such as malaria and intermittent fever. It is an anti-Inflammatory agent which is specially used as a remedy for enlargement of liver and

spleen. It is also used for the treatment of scrofula, fistula, acute spreading suppurations and other skin diseases.<sup>9</sup>

The Fruits of the *Berberis lycium* are very nutritious and are known to contain appreciable amount of various nutrient. The moisture, ash, crude protein, crude fat and crude fibre content in fruits are 84.0, 0.53, 1.49, 1.28 and 1.48 per cent. The extractable juice of the fruit is 26.6 per cent however, total soluble solids of the juice amount to 18.90 per cent, having 1.07 per cent acidity, 13.58 per cent total sugars, of which are in the form of reducing sugars i.e. glucose and fructose and contained lower concentration of phenolic compound. The fruit contains 0.37 per cent pectin. Its vitamin C content is only 24.60 mg per 100 ml of juice. The  $\beta$  carotene content in the fruit is in the range of 343.0- 453.0  $\mu\text{g}/100 \text{ g}$ . However the anthocyanin content which leads to colour in the fruit and are indicator of maturity is 82.47 mg/100 g. These fruits are also an appreciable source of various minerals like calcium, phosphorus, iron, sodium, potassium etc. The various antinutrients like oxalates, phytic acid, phytate phosphorus etc. are absent in these fruits however tannins are present at very low concentration of 7 percent. The leaves of *Berberis lycium* have maximum moisture content ( $59.84\pm0.19\%$ ) followed by shoot and root ( $44.75\pm0.25\%$ ,  $31.55\pm0.05\%$ ), whereas fat and fiber contents ( $0.46\pm0.01$ ,  $43.85\pm0.46\%$ , respectively) decreased in ascending order i.e. root > shoot > leaves. When mineral composition in the separate parts of the *Berberis lycium* was analysed, it was revealed that Zn, Cu and Na were maximum ( $56.15\pm0.01$ ,  $95.67\pm0.12$ ,  $115.00\pm0.03 \mu\text{g g}^{-1}$ , respectively) in root and while Mn, P, Ca ( $136.12\pm0.01$ ,  $1315.00\pm0.01$ ,  $2389.00\pm0.04 \mu\text{g g}^{-1}$ , respectively) in leaves whereas K ( $5824.00\pm0.58\mu\text{g g}^{-1}$ , respectively) in shoot. Fruits of *Berberis lycium* are cool and laxative and are used for the relief of intestinal colic and pharyngitis. Decoction of fruit is also used in typhoid and fever.<sup>10</sup>

The leaves of the plant are used in the treatment of jaundice and as tea substitute. The stem of *Berberis lycium* are known to be diaphoretic and

laxative and are useful in rheumatism. The stem bark is very effective and in combination with root it is used in case of ear injury, whooping cough, headache etc. The stem is also used in treatment of ophthalmia and jaundice. Berberine is the major alkaloid present in the rhizomes of *Berberis lycium* which has antibacterial effect. But this berberine is not appreciably absorbed by the body so it is used externally for the treatment of various enteric infections especially bacterial dysentery. Berberine is also known to have antitumor effect.<sup>11</sup>

## **PHARMACOLOGICAL SCREENING**

### **Anti-Inflammatory Activity**

#### **Carrageenan Induced Paw Edema Model**

Rats were divided into two groups of six animals each. Group A served as extract treated orally, Group B with drug and served as standard. Noted the initial paw volume of each rat by mercury displacement method. After 30 minute 0.1 ml of 1% (w/v) carrageenan was injected to the plantar region of left paw of control as well as drug treated. The right paw will serve as reference non-inflamed paw for rat and noted the paw volume of both legs of control and drug treated rats at 15, 30, 60 and 120 min.

## **RESULTS**

### **Acute Toxicity**

Acute toxicity study for extract was performed according to OECD guidelines 423 using Swiss albino mice. At 2000 mg/kg, the extract was neither produced mortality nor the signs of morbidity. Hence, the dose 100 mg/kg was selected for further studies.

### **Phytochemical Analysis**

The results of the chemical tests performed in the screening, revealed the presences of flavonoids, alkaloids, tannins, carbohydrates, glycosides in the methanolic extract of *Berberis lycium* root.

### **Assessment of Anti-Inflammatory Activity**

The Methanolic extract of *Berberis lycium* not showed any anti-inflammatory activity.

## **DISCUSSION**

Medicinal plants have served as sources of readily accessible, inexpensive, and effective

medication since the earliest times known to man. Several ethnomedicinal plants have been found to possess anti-inflammatory profile and serve as alternative to modern medicine. *Berberis lycium* (berberiaceae) has not yet been evaluated for its anti-inflammatory activity. The aim of the present study was to evaluate the anti-inflammatory properties produced by methanolic extract of the roots of *Berberis lycium* in carrageenan model. The acute oral toxicity study of methanolic extract of *Berberis lycium* was carried out in accordance to OECD guidelines 423. The findings indicated that the methanolic extract of *Berberis lycium* was found to be devoid of any

serious toxic symptoms. Based on these results the dose were selected for the further pharmacological evaluation<sup>12</sup>. The phytochemical constituents of the plant include flavonoids, alkaloids, glycosides and tannins. The methanolic extract of *Berberis lyceum* root may not have significant anti-inflammatory effect.

## CONCLUSION

In the present study the methanolic extract of roots of *Berberis lyceum* revealed the presence of phytochemical constituents such as Flavanoids, Glycosides, Alkaloids, Triterpenoids Steroids.



**Table I:** Phytochemical analysis of *Berberis lycium* root extract

Saponins	-
Flavonoids	+
Alkaloids	+
Glycosides	+
Tannins	-
Steroids	+
Triterpenoids	+

“+” indicates presence and “-” indicates absences of the phytochemical constituents.

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