Barberry

Berberis vulgaris

Common names

Common barberry, European barberry, berberry, pipperidge bush

Family

Berberidaceae and *Ranunculaceae* (buttercup)

Part used

Root and stem

Background and traditional uses

There are more than 450 species of the *Berberis* genus. Common or European barberry is a large shrub with upright, branched, woody stems that grows from 2.5-3m high. The entire plant is covered in an ash-coloured bark. It has alternate, shortly petioled leaves that grow to around 2.5-4cm long, the primary leaves being reduced to three-forked spines with an enlarged base and the secondary leaves being oval, simple and narrow at the base growing in fascicles. The shrub is covered in racemes of small, pale yellow flowers and the berries are oblong, slightly curved and about 1-1.5cm long. They ripen to a beautiful red colour and have a pleasantly acidic taste. Gerard praised both the berries and leaves as a seasoning for meats and salads. Cows, sheep, goats and a plethora of flying insects are especially fond of barberry.[1]

Barberry is indigenous to many areas of Europe and is naturalised in Britain. The root and stem have a long history of use in western herbal medicine (WHM), where they were traditionally prepared as a decoction for a spring tonic that would purify the blood and wash the mouth and eyes. The Eclectics also considered barberry to be a seasonal tonic herb, but also prescribed it specifically for diarrhoea, dysentery and parasitic infections including malaria.[2,3]

Actions

Primary:[2]

- Antiemetic
- Antimicrobial
- Antiparastic
- Cholagogue
- Choleretic
- Bitter tonic

Secondary:[2]

- Antidiarrhoeal
- Antifungal
- Aperient

Applications and indications

- Bacterial, fungal and protozoal infections, particularly those affecting the gastrointestinal system[2]
- Cases where improved bile flow is beneficial[2]
- Liver and gallbladder dysfunctions where there is no bile duct obstruction (including jaundice, biliousness, cholecystitis and gallstones)[2]
- Diarrhoea (smaller doses)[2]
- Constipation (larger doses)[2]

Barberry also has theoretical applications for congestive heart failure, arrhythmia, cancer prevention and thrombocytopaenia.[2]

Active constituents and pharmacodynamics

The majority of empirical data compiled on barberry has focused on the medicinal properties of isolated berberine. These include antimicrobial, antibacterial, antifungal, antimycobacterial and antiprotozoal activity.[4] Additionally, berberine appears to inhibit intestinal ion secretion and microbe originating toxin formation, reduce cyclic adenosine monophosphate (cAMP) and activate alpha-2 adrenoreceptors, thereby reducing intestinal activity and exerting an antidiarrhoeal effect.[4]

Berberine has been studied extensively for its actions against a wide variety of fungi, protazoans, helminths, viruses and bacteria and appears to be effective against both Gram-positive and Gram-negative microbes. Mosby's Handbook of Herbs and Natural Supplements includes an exhaustive list of microbes that berberine has been shown to act against that includes:[4,5]

- *Bacillus pumilus*
- *Bacillus cereus*
- *Bacillus subtilis*
- *Corynebacterium diphtheriae*
- *Shigella boydii*
- *Staohylococcus aureus*
- *Staphylococcus albus*
- *Streptococcus pyrogenes*
- *Vibrio cholerae*
- *Candida utilis*
- *Candida albicans*
- *Candida tropicalis*
- *Candida glabrata*
- *Sporotrichum schenkii*
- *Entamoeba histolytica*
- *Giardia lamblia*
- *Trichomonas vaginalis*
- *Leishmaniasis sp.*
- *Escherichia coli (E.coli)*
- *Klebsiella pneumoniae*
- *Mycobacterium tuberculosis*
- *Trichophyton mentagrophytes*

Summary of clinical evidence

The majority of human and animal trials related to barberry have taken place using isolated berberine.

Diarrhoea

A double-blind, randomised, placebo-controlled trial on 400 patients with acute, watery diarrhoea divided the group into four. Patients were prescribed tetracycline (500mg), berberine hydrochloride (100mg), a combination of tetracycline (500g) and berberine hydrochloride (100mg) or placebo four times daily. Of the groups administered berberine hydrochloride, 77% experienced an average volume reduction of 1L of stool output after 24 hours of treatment.[6]

In a non-controlled study, 137 children with giardiasis were prescribed oral berberine at a dose of 10mg/kg/day for 10 days, which resulted in a parasitological 'cure' comparable to quinacrin hydrochloride, furazolidine and metronidazole within 10 days of treatment.[7]

Intestinal Parasites

The potential antiparasitic properties of berberine have been shown repeatedly *in vivo:*

- Berberine sulfate has been shown to inhibit the growth of *Giardia lambda, Trichomonas vaginalis* and *Entamoeba histolytica,* inducing morphological changes in all three parasites.[8]
- Berberine has also been shown to significantly diminish the parasite load of *Leishmania donovani* in hamsters, inhibiting both endogenous and glucose stimulated respiration of amastigotes.[9]
- Berberine sulfate was shown to inhibit the intestinal secretory responses induced by *E. coli* and *Vibrio cholera* by 70% *in vivo*.[10]

Hypercholesterolaemia

In one clinical trial, 32 patients with hypercholesterolaemia were administered 0.5g of isolated berberine twice daily for three months. At the conclusion of the trial, the participants averaged a 29% reduction in cholesterol, a 35% reduction in triglycerides and a 25% reduction in LDL cholesterol with unchanged HDL levels. The researchers also noted that the berberine treatment resulted in improved liver enzyme results in the majority of participants.[11]

Type 2 Diabetes

In a randomised trial, 36 patients with type 2 diabetes (T2DM) were split into two groups and administered either 500mg berberine three times daily or 500mg metformin three times daily for 13 weeks. At the conclusion of the study, berberine was shown to be as effective as metformin in reducing haemoglobin A1c (HbA1c) levels, fasting blood glucose levels and post-prandial blood glucose levels.

A second group of 48 patients with T2DM, which was poorly controlled on their existing medication, were split into two groups with one remaining on their current regime and the other receiving 500mg of berberine three times daily for the same 13 weeks. At the conclusion of the trial, the group receiving berberine showed significant reductions in fasting and post-prandial blood glucose levels, fasting insulin, LDL cholesterol, total cholesterol and triglycerides.[12]

Dosage summary

Liquid extract (1:1): 10-20mL weekly[13]
Liquid extract (1:2): 20-40mL weekly[13]

Safety information

- Doses supplying more than 0.5g of pure berberine may result in gastrointestinal distress (nausea, vomiting, diarrhoea), eye and skin irritations, dizziness, lethargy and kidney problems.[14]
- Due to the lack of human trials on barberry, drug interactions are speculative. Theoretically, the herb should be prescribed with caution for individuals taking drugs metabolised by the P450 enzyme pathway as berberine has been shown to effect liver enzymes.[15]
- Caution is also advised in prescribing barberry to patients with cardiovascular conditions, taking cardioactive medicines and with kidney diseases due to the cardioactive properties of berberine.[15]
- Contraindicated in pregnancy and lactation due to alkaloidal content.[16]

References

1. Grieve M. A Modern Herbal. London: Tiger Books International, 1931.
2. Bone K, Mills S. Principles and practice of modern phytotherapy, 2nd edn. Sydney: Churchill Livingstone Elsevier, 2013.
3. Heber D. PDR for Herbal Medicines, 4th ed. Montvale; Thomson Reuters, 2007.
4. Braun L, Cohen M. Herbs and natura supplements: an evidence-based guide, 4th Edition. Sydney: Churchill Livingstone Elsevier, 2014.
5. Skidmore-Roth L. Mosby's Handbook of Herbs and Natural Supplements, 4th ed. St Louis; Mosby Elsevier, 2010.
6. Maung-U K, Myo-Khin, Nyunt-Nyunt-Wai, et al. Clinical trial of berberine in acute watery diarrhea. Br Med J (Clin Res Ed) 1985;291(6509:1601-1605.
7. Gupte S. Use of berberine in treatment of giardiasis. Am J Dis Child 1975;129(7):866.
8. Kaneda Y, Torii M, Tanaka T, et al. *In vitro* effects of berberine sulphate on the growth and structure of *Entamoeba histolytica, Giardia lamblia* and *Trichomonas vaginali*. Ann Trop Med Parasitol 1991;85(4):417-425.
9. Ghosh AK, Bhattacharyya FK, Ghosh DK. *Leishmania donovani*: amastigote inhibition and mode of action of berberine. Exp Parasitol 1985;60(3):404-413.
10. Sack RB, Froehlich JL. Berberine inhibits intestinal secretory response of *Vibrio cholerae* and *Escherichia coli* enterotoxins. Infect Immun 1982;35(2):471-475.
11. Kong W, Wei J, Abidi P, et al. Berberine is a novel cholesterol lowering drug working through a unique mechanism distinct from statins. Nat Med 2004;10(12):1344-1351.
12. Yin J, Xing H, Ye J. Efficacy of berberine in patients with type 2 diabetes. Metabolism 2008;57(5):712-717.
13. World Health Organization (WHO). *Cortex Berberidis*. Monographs on selected medicinal plants, vol. 4. Geneva: WHO, 2009. Viewed 4 Apr 2019, http://apps.who.int/medicinedocs/documents/s16713e/s16713e.pdf#page=38
14. Blumenthal M, Goldberg A, Brinckmann J. Herbal medicine: expanded Commission E monographs. Austin: American Botanical Council, 2000.
15. Blumenthal M. The ABC Clinical Guide to Herbs. New York: Thieme, 2003.
16. Braun L, Cohen M. Herbs and natural supplements: an evidence-based guide, 4th Edition. Sydney: Churchill Livingstone Elsevier, 2014.

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