

# Berberis Vulgaris - A Shrub That Contains Nutraceuticals

Madalina-Elena Crista, Monica Butnariu\*

Chemistry & Biochemistry Discipline, Life Sciences University King Michael I from Timisoara, 300645, Calea Aradului 119, Timis, Romania.

**\*Corresponding Author:** Monica Butnariu, Chemistry & Biochemistry Discipline, Life Sciences University King Michael I from Timisoara, 300645, Calea Aradului 119, Timis, Romania.

**Received date: January 31, 2023; Accepted date: February 15, 2023; Published date: February 24, 2023**

**Citation:** Madalina E. Crista, Butnariu M., (2023), Berberis Vulgaris - A Shrub That Contains Nutraceuticals, *International Journal of Biomed Research*. 2(1): DOI: 10.31579/2834-8087/012

**Copyright:** © 2023, Monica Butnariu, This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

## Abstract

Berberis vulgaris bark contains active constituent; i.e., alkaloids; berberine, berbamine, oxyacanthine, palmatin, iotrorizin, tannins, resins, vitamin C. The fruits and leaves are also used in a restricted manner. Preparations and extracts from Berberis vulgaris have cholagogue, hemostatic, stomach tonic, diuretic, febrifuge, vasodilator, hypotensive, bacteriostatic (active against the tuberculosis bacillus), antispastic, cytostatic action. Phytotherapy with yellowwood preparations finds applications in the treatment of hepato-biliary diseases, jaundice, metrorrhagia, stomatitis, gingivitis, tuberculosis and leishmaniasis. Berberis vulgaris fruits contain glucose, fructose, malic acid, pectins, vitamin C, without the presence of alkaloids from the bark. They can be consumed as food, in the form of juice, syrup, jam, being a source of vitamin C.

**Keywords:** berberis vulgaris; alkaloids; berberine; blood sugar

## Introduction

Berberis vulgaris is a shrub native to Europe, it is part of the Berberidaceae family, it grows spontaneously at the edge of forests, through bushes, in areas with a lot of sun, it is cultivated as a hedge for its special appearance, it can reach heights of two meters, the popular name wood yellow, acryl, gooseberry, river buckthorn, dogwood, gorse, noble sorrel, river sorrel, goat sorrel, etc. [1,2].

It is a thorny shrub, the branches are red when young, yellow when mature when the bark hardens and turns Gray, and are covered with thorns grouped in groups of three, diverging [3].

For medicinal purposes, the bark on the stems and roots are used, they are harvested in the months of September - October, the leaves and fruits are used less [4].

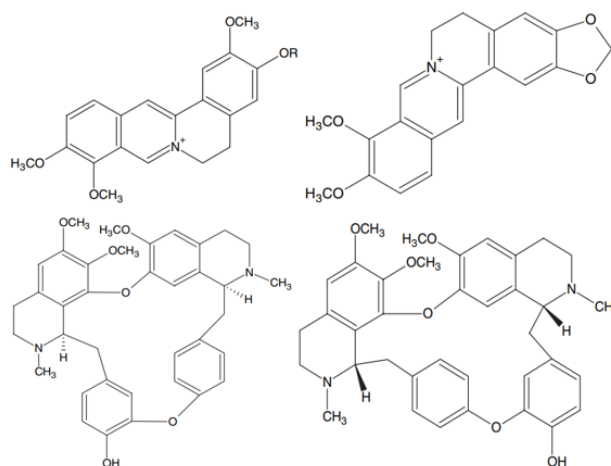
The Berberis vulgaris plant contains active constituent with a pharmacodynamic nature: berberine [C<sub>20</sub>H<sub>18</sub>NO<sub>4</sub>], berbamine [C<sub>37</sub>H<sub>40</sub>N<sub>2</sub>O<sub>6</sub>], Oxyacanthine [C<sub>37</sub>H<sub>40</sub>N<sub>2</sub>O<sub>6</sub>], palmatin [C<sub>21</sub>H<sub>24</sub>NO<sub>4</sub>], Cyanazine [C<sub>9</sub>H<sub>13</sub>ClN<sub>6</sub>] in the category alkaloids; vitamin C [C<sub>6</sub>H<sub>8</sub>O<sub>6</sub>],

tannins (Gallo tannins, ellagitannins, condensed tannins, and complex tannins), phenolic compounds and anthocyanins; resins; etc. compounds who has collagenous, stomachic, choleric, vaso-dilating, hypotensive, cytostatic, febrifuge properties.

## The Case

Its nutritional composition, mechanisms of action in disease prevention and treatment, traditional uses and properties reported by recent studies were evaluated. The fruits of the Berberis vulgaris plant are used for medicinal purposes. They have a sour taste.

They are rich in vitamins A and C, calcium, iron, potassium, zinc, copper, vitamin K, triterpenoids and anthocyanins. They contain over 10 phenolic compounds and over 30 alkaloids (figure 1) i.e., berberine and other isoquinoline alkaloids such as: bersavine, berbostrejdine and muraricine; or secobisbenzyl-isoquinoline alkaloids named (+)-chenabinol, (-)-berkristine and (-)-verfilline.



**Figure 1: Chemical structure of berberine alkaloids from *Berberis vulgaris*.**

Other pharmacodynamic compounds from *Berberis vulgaris* are: tartaric acid, citric acid, pectin, resin, dextrose, fructose and malic acid. *Berberis vulgaris* fruit is endowed with various therapeutic properties, such as: anticarcinogenic, anti-inflammatory, antioxidant, antidiabetic, antibacterial, analgesic, antinociceptive, hepatoprotective. *Berberis vulgaris* contains berberine, a substance with scientifically proven antidiabetic effects.

## Discussion

Berberine [C<sub>20</sub>H<sub>18</sub>NO<sub>4</sub>], herbal alkaloid molecule] from *Berberis vulgaris* helps lower blood sugar by improving the cells' response to insulin. Clinical studies on subjects included in the study with type 2 diabetes have shown favourable results. Decreases blood sugar and glycated hemoglobin [5]. The fruits produced a notable decrease in serum glucose and glycated hemoglobin during the 8-week intervention [6]. A 3-month study showed that 1.5 g of berberine per day produced a 2% decrease in glycated hemoglobin. This is an indicator of blood sugar control over the past 3 months [7]. Acts like extended-release drugs; which would contain the active substance metformin hydrochloride. Berberine has been found to have effects comparable to those of metformin [8]. Berberine from *Berberis vulgaris* could replace drugs for reducing too high blood glucose levels in adult subjects included in the study with type II diabetes [9]. In another study, administration of 3 g of dragon fruit extract per day for 3 months improved glycemic control, total antioxidant capacity, lipoprotein and apoprotein levels. Similar effects were also obtained with 2 mg of dried fruit extract per day. This treatment lowered Glycated hemoglobin, also known as HbA1c, and blood sugar levels [10].

Aqueous extracts of milk thistle have also shown good effects on the cardiovascular and neural systems. They may help treat high blood pressure, tachycardia, and neurological disorders such as epilepsy and seizures [11]. Berberine from *Berberis vulgaris* prevents metabolic syndrome (consumption of berberine has good effects to remission of metabolic syndrome and the reduction in waist circumference, SBP, triglycerides, and total insulin secretion, with a rise in insulin reactivity) [12]. Consuming jackfruit may help prevent metabolic syndrome by reducing associated risk factors. In a study of 46 subjects included in the study with type 2 diabetes, drinking one glass (200 mL) of jackfruit juice per day lowered blood pressure, triglycerides, cholesterol, and blood sugar. The study lasted 2 months [13]. Moreover, dragon fruit alleviates oxidative stress that can lead to various chronic diseases. Another study effect was found in a study on 106 subjects included in the study with metabolic syndrome, who consumed 600 mg of dried *Berberis vulgaris* per day [14].

## Conclusion

Alkaloids, especially Berberine from *Berberis vulgaris*, have a depressing effect on the heart and breathing. It stimulates the smooth muscles of the intestines, uterus, and other organs. They have vasodilatory action and produce bronchoconstriction. In small doses, it stimulates cardiac activity by acting on the coronary arteries. Oxyacanthin isolated from the bark of this species has vasodilatory and hypotensive action. Berberine is 10 times superior to phenylbutazone, releasing protein-bound bilirubin and 100 times superior to papaverine - an alkaloid similar to berberine. Berberine and oxyacanthine have antibacterial action. Berberine has amebicidal, anti-parasitic and anti-fungal action. Berberine and hydrastine act against the activity of *Helicobacter pylori* bacteria. In small doses berberine is a cardiac and respiratory stimulator, and in large doses it acts as an inhibitor of cardiac and respiratory activity. Berberine, oxyacanthine and barbamine have anti-inflammatory action. Berberine has anti-diarrheal action.

## Conflicts of Interest

The authors declare that they have no conflicts of interest.

## References

1. Rahimi-Madiseh M, Lorigoini Z, Zamani-Gharaghoshi H, Rafieian-Kopaei M. (2017). *Berberis vulgaris*: specifications and traditional uses. *Iran J Basic Med Sci.*; 20(5):569-587.
2. Bahmani, M., Zargar, A., Rafieian-Kopaei, M., & Saki, K. (2014). Ethnobotanical study of medicinal plants used in the management of diabetes mellitus in the Urmia, Northwest Iran. *Iran. Asian Pac J Trop Med.* 7S1:S348-354.
3. Imanshahidi M, Hosseinzadeh H. (2008) Pharmacological and therapeutic effects of *Berberis vulgaris* and its active constituent, berberine. *Phytother Res.* 22(8):999-1012.
4. Mohseni F, Rafaeie R, Rezaeian L, Niroumand Sarvandani M, Kalalian Moghaddam H. (2023) Berberine hydrochloride improves cognitive deficiency through hippocampal up-regulation of neurotrophins following inhalant self-administration of methamphetamine. *Iran J Basic Med Sci.* 26(1):23-29.
5. Belwal, T., Bisht, A., Devkota, H. P., Ullah, H., Khan, H., et al. (2020). Phytopharmacology and Clinical Updates of *Berberis* Species Against Diabetes and Other Metabolic Diseases. *Front Pharmacol.* 11:41.
6. Derosa, G., D'Angelo, A., & Maffioli, P. (2022). The role of selected nutraceuticals in management of prediabetes and

- diabetes: An updated review of the literature. *Phytotherapy research: PTR*, 36(10), 3709–3765.
7. Khoshandam A, Imenshahidi M, Hosseinzadeh H. (2022). Pharmacokinetic of berberine, the main constituent of *Berberis vulgaris* L.: A comprehensive review. *Phytother Res*. 36(11):4063-4079.
  8. Imenshahidi M, Hosseinzadeh H. (2019). Berberine and barberry (*Berberis vulgaris*): A clinical review. *Phytother Res*. 33(3):504-523.
  9. Ye Z, Wang Q, Dai S, Ji X, Cao P, et al. (2022). The *Berberis vulgaris* L. extract berberine exerts its anti-oxidant effects to ameliorate cholesterol overloading-induced cell apoptosis in the primary mice hepatocytes: an in vitro study. *In Vitro Cell Dev Biol Anim*. 58(10):855-866.
  10. Bilal, M., Ahmad, S., Rehman, T., Ghauri, A. O., Khalid, S., et al. (2021). Anti-Hyperuricemic and Uricosuric Potential of *Berberis vulgaris* in Oxonate-Induced Hyperuricemic Rats. *Dose Response*. 19(3):15593258211040329.
  11. Kazemipoor, M., Fadaei Tehrani, P., Zandi, H., & Golvardi Yazdi, R. (2021). Chemical composition and antibacterial activity of *Berberis vulgaris* (barberry) against bacteria associated with caries. *Clin Exp Dent Res*. 7(4):601-608.
  12. Danoun S, Balayssac S, Gilard V, Martino R, Malet-Martino M. (2023). Quality evaluation of berberine food supplements with high-field and compact 1H NMR spectrometers. *J Pharm Biomed Anal*. 223:115161.
  13. Zarei A, Changizi-Ashtiyani S, Taheri S, Ramezani M. (2015). A quick overview on some aspects of endocrinological and therapeutic effects of *Berberis vulgaris* L. *Avicenna J Phytomed*. 5(6):485-497.
  14. Jamialahmadi T, Guest PC, Tasbandi A, Al-Rasadi K, Sahebkar A. (2022). Measuring the Effects of Berberine on Serum Prooxidant-Antioxidant Balance in Metabolic Syndrome. *Methods Mol Biol*. 2343:309-318.

#### Ready to submit your research? Choose ClinicSearch and benefit from:

- fast, convenient online submission
- rigorous peer review by experienced research in your field
- rapid publication on acceptance
- authors retain copyrights
- unique DOI for all articles
- immediate, unrestricted online access

**At ClinicSearch, research is always in progress.**

Learn more <https://clinicsearchonline.org/journals/international-journal-of-biomed-research>



© The Author(s) 2023. **Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>. The Creative Commons Public Domain Dedication waiver (<http://creativecommons.org/publicdomain/zero/1.0/>) applies to the data made available in this article, unless otherwise stated in a credit line to the data.