

# Natural compounds with important medical potential found in *Helleborus* sp.

## Review Article

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**Abstract:** *Helleborus* (family Ranunculaceae) are well-known as ornamental plants, but less known for their therapeutic benefits. Over the past few years, *Helleborus* sp. has become a subject of interest for phytochemistry, pharmacology and other medical research areas. On the basis of their usefulness in traditional medicine, it was assumed that their biochemical profile could be a source of metabolites with the potential to overcome critical medical issues. There are studies involving natural extracts from these species which demonstrate that *Helleborus* plants are a valuable source of chemical compounds with great medical potential. Some phytochemicals produced by these species have been separated and identified a few decades ago: hellebrin, degluco-hellebrin, 20-hydroxyecdysone and protoanemonin. Lately, many other active compounds have been reported and considered as promising remedies for severe diseases such as cancer, ulcer, diabetes and also for common medical problems such as toothache, eczema, low immunity and arthritis. This paper is an overview of the *Helleborus* genus focusing on some recently-discovered compounds and their potential for finding new drugs and useful biochemicals derived from these species.

**Keywords:** *Helleborus* sp. • Phytochemicals • Secondary metabolites • Active compounds • Therapeutic potential • Anticancer properties • Cytotoxicity • Immunomodulation

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## 1. Introduction

Current studies regarding species of *Helleborus* are opening new ways to cure diseases using natural compounds. Plants belonging to this group have long been used in traditional medicine to treat various conditions, such as edema, arthritis and ulcer. In the Balkan area, *Helleborus* extracts have been used for a long time in traditional medicine as painkillers or as anti-inflammatory remedies and in veterinary medicine against infectious diseases. Several active compounds including cardioactive glycosides, sterol saponosides, ecdysteroids and  $\gamma$ -lactones have recently been isolated from plants of this genus and shown to exert antioxidant, anti-inflammatory and antimicrobial effects. Anti-diabetic and antitumoral properties were suggested, but further investigations are required. Due to the scarcity of clinical

trials, there are few published reports on target-organ toxicity or side effects. This review summarizes the latest literature on the pharmacological, toxicological, and clinical studies of *Helleborus* and its active compounds. Advancing our understanding of the secondary metabolite biosynthesis and ability to detect cell lines with high level of active principles may positively impact human health at a worldwide scale.

## 2. Biology and traditional use of *Helleborus* spp.

*Helleborus* spp. (*Ranunculaceae*), or hellebore, is a perennial herb native to Europe and Asia. The genus comprises around 20 species. The underground parts – rhizomes - containing starch granules and oleosomes

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