

REVIEW

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# Therapeutic roles of natural remedies in combating hereditary ataxia: A systematic review

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## Abstract

**Background:** Hereditary ataxia (HA) represents a group of genetically heterogeneous neurodegenerative diseases caused by dysfunction of the cerebellum or disruption of the connection between the cerebellum and other areas of the central nervous system. Phenotypic manifestation of HA includes unsteadiness of stance and gait, dysarthria, nystagmus, dysmetria and complaints of clumsiness. There are no specific treatments for HA. Management strategies provide supportive treatment to reduce symptoms.

**Objectives:** This systematic review aimed to identify, evaluate and summarise the published literature on the therapeutic roles of natural remedies in the treatment of HA to provide evidence for clinical practice.

**Methods:** A systematic literature search was conducted using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). Web of Science, PubMed and Science Direct Scopus were thoroughly searched for relevant published articles from June 2007 to July 2020.

**Results:** Ten pre-clinical and two clinical studies were eligible for inclusion in this systematic review. We identified the therapeutic roles of medicinal plants *Brassica napus*, *Gardenia jasminoides*, *Gastrodia elata*, *Ginkgo biloba*, *Glycyrrhiza inflata*, *Paeonia lactiflora*, *Pueraria lobata* and *Rehmannia glutinosa*; herbal formulations Shaoyao Gancao Tang and Zhengan Xifeng Tang; and medicinal mushroom *Hericium erinaceus* in the treatment of HA. In this review, we evaluated the mode of actions contributing to their therapeutic effects, including activation of the ubiquitin–proteasome system, activation of antioxidant pathways, maintenance of intracellular calcium homeostasis and regulation of chaperones. We also briefly highlighted the integral cellular signalling pathways responsible for orchestrating the mode of actions.

**Conclusion:** We reviewed the therapeutic roles of natural remedies in improving or halting the progression of HA, which warrant further study for applications into clinical practice.

**Keywords:** Hereditary ataxia, Natural remedy, Medicinal plant, Herbal formulation, Medicinal mushroom

## Background

Ataxia is defined as the loss of full control of bodily movements, and can be inherited, acquired, or occur sporadically [1]. Hereditary ataxia (HA) represents a group of genetically heterogeneous neurodegenerative diseases resulting from dysfunction of the cerebellum or disruption of connection between the cerebellum and other

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