



GOJI BERRIES IN ANTI-AGING AND PREVENTIVE MEDICINE

Yuliya Tereshchuk¹, <https://orcid.org/0009-0000-6629-4417>
✉ Oksana Makar¹, <https://orcid.org/0000-0002-1863-1412>

¹Department of Rehabilitation, Faculty of Postgraduate Education, Danylo Halytsky Lviv National Medical University, Lviv, Ukraine

Received: October 21, 2025

Accepted: December 28, 2025

Corresponding author: Oksana Makar **E-mail:** kaf_rehabilitationmed_fpge@meduniv.lviv.ua

Abstract

Aging is a multifactorial biological process characterized by progressive functional decline, increased susceptibility to chronic diseases, and reduced physiological resilience. Functional foods and nutraceuticals have gained increasing attention as supportive strategies within anti-aging and preventive medicine. Among them, goji berries (*Lycium barbarum* and *Lycium chinense*) are widely consumed; however, their biological relevance and clinical significance require careful, evidence-based evaluation. This narrative review summarizes and critically analyzes experimental and clinical data regarding the effects of goji berries on biological mechanisms and organ systems relevant to aging. Particular emphasis is placed on distinguishing mechanistic and preclinical findings from human clinical evidence. Available data indicate that antioxidant, immunomodulatory, and metabolic effects are predominantly supported by experimental studies, while human evidence is most consistent for ocular health outcomes, including plasma zeaxanthin levels and macular characteristics. Limitations of current evidence and directions for future research are discussed.

Keywords: goji berries, functional food.

How to cite: Tereshchuk Y, Makar O. Goji berries in anti-aging and preventive medicine. *Anti Aging East Eur* 2025;4(4):246-249 <https://doi.org/10.56543/aaeeu.2025.4.4.07>



Key Messages for Research and Practice

- Bioactive compounds of goji berries demonstrate biological activity highly dependent on structural characteristics, processing, and standardization.
- Most reported antioxidant and immunomodulatory effects are supported by experimental studies, while robust clinical evidence is limited.
- Human data are most consistent for ocular health benefits rather than systemic anti-aging effects.
- Goji berries may be considered a functional food supporting antioxidant status and eye health rather than a therapeutic anti-aging intervention.
- Claims related to systemic rejuvenation or longevity enhancement should be interpreted cautiously.
- Integration into preventive strategies should be individualized and evidence-informed.

Introduction

Aging is a complex biological process associated with oxidative stress, chronic low-grade inflammation, metabolic dysregulation, immune remodeling, and mitochondrial dysfunction [1–5]. These interconnected mechanisms contribute to the development of age-related diseases and to the decline in healthspan rather than chronological lifespan alone. Contemporary anti-aging and preventive medicine increasingly focuses on modifiable lifestyle factors, including nutrition, as supportive strategies aimed at maintaining physiological resilience rather than reversing aging processes [6–8].

Goji berries, derived primarily from *Lycium barbarum* and *Lycium chinense*, have a long history of traditional use and are currently promoted as functional foods. Despite their popularity, claims related to longevity and systemic rejuvenation often exceed the strength of available clinical evidence. Therefore, a critical synthesis of experimental and human data is required.

The aim of this review is to evaluate the biological significance of goji berries in the context of healthy aging by integrating evidence from experimental studies and clinical findings, while clearly delineating the level of evidence supporting the reported effects.

Bioactive Components of Goji Berries

Goji berries contain a diverse range of bioactive compounds, including polysaccharides (*Lycium barbarum* polysaccharides, LBPs), carotenoids (notably zeaxanthin and its esterified forms), phenolic compounds, flavonoids, and betaine [9–11].

LBPs represent a structurally heterogeneous group of carbohydrate polymers whose biological activity is influenced by molecular weight, monosaccharide composition, and extraction methods. Recent reviews emphasize structure–function relationships underlying their experimentally observed biological effects, primarily based on mechanistic and preclinical studies [12]. Analytical studies using advanced chromatographic techniques have demonstrated that zeaxanthin and zeaxanthin dipalmitate are the predominant carotenoids in goji berries, supporting their relevance for ocular antioxidant protection [11].

Molecular and Cellular Mechanisms Relevant to Aging

Experimental studies suggest that goji-

derived compounds may influence key molecular pathways implicated in aging, including redox-sensitive signaling, inflammatory cascades, and metabolic regulation [13–16]. Experimental *in vitro* and *in vivo* studies show that LBPs are able to reduce reactive oxygen species (ROS), reduce lipid peroxidation, and increase the activity of key antioxidant enzymes, including superoxide dismutase (SOD), catalase, and glutathione peroxidase. Cellular studies demonstrate active uptake of LBPs by immune cells, supporting their potential for direct intracellular effects [13].

Experimental data suggest the modulation of oxidative stress responses and inflammatory signaling pathways, including those associated with immune activation. However, these findings are derived predominantly from *in vitro* and animal models and should not be directly extrapolated to clinical anti-aging effects in humans [12,17].

Effects on Major Organ Systems

Immune System

Immunosenescence and chronic low-grade inflammation are hallmarks of aging. In this context, LBPs demonstrate the ability to modulate the inflammatory response through their effects on the production of pro-inflammatory cytokines, in particular TNF- α , IL-6 and IL-1 β . These effects are linked to the regulation of NF- κ B and MAPK signaling cascades, as confirmed in cellular and animal models. At the same time, it is important to note that the anti-inflammatory effect of goji berries is immunomodulatory, not immunosuppressive, which is fundamentally important for preventive medicine. Review evidence indicates that *Lycium barbarum* fruit exhibits immunomodulatory and anti-inflammatory properties, largely demonstrated in experimental and preclinical models. These effects include modulation of immune cell activity and inflammatory signaling pathways, whereas direct clinical evidence in humans remains limited [13,14,23].

Metabolic and Cardiometabolic System

Preclinical studies report hypoglycemic, hypolipidemic, and hepatoprotective effects of goji berry extracts, with mechanisms involving regulation of lipid metabolism and AMPK signaling. In models of diet-induced obesity and experimental diabetes, administration of LBPs was associated with reduced fasting glucose levels, improved glucose tolerance, and reduced insulin resistance. In animal models of hyperlipidemia, the use of *Lycium barbarum* extracts was associated with a reduction in total cholesterol and triglyceride

levels, as well as an improvement in the lipoprotein ratio [15,16].

However, human studies show heterogeneous results, and robust clinical evidence supporting metabolic benefits in aging populations is currently insufficient.

Ocular Health

The most consistent clinical evidence related to goji berries concerns ocular health. Goji berries are one of the richest dietary sources of zeaxanthin, primarily in the form of zeaxanthin dipalmitate. Zeaxanthin is a structural component of the macular pigment of the retina and plays a key role in filtering blue light and neutralizing reactive oxygen species. Dietary intervention studies demonstrate increased plasma zeaxanthin levels following goji berry consumption, reflecting high bioavailability [19]. Clinical intervention studies in healthy adults and middle-aged and older adults have shown that consumption of goji berries or goji-based products may lead to increased macular pigment optical density (MPOD) and improvements in certain functional visual parameters. Of particular note is the fact that in some studies, the effects of goji on macular pigmentation were comparable to or even exceeded the effects of traditional lutein-zeaxanthin supplements, which are associated with a specific form of zeaxanthin and associated antioxidant components. These studies support the role of goji berries in supporting eye health rather than a systemic anti-aging effect [20].

Skin and Other Systems

The skin is another target organ for aging, especially under chronic UV exposure. Photoaging is characterized by collagen degradation, increased levels of matrix metalloproteinases, impaired barrier function, and accumulation of oxidative damage. Experimental studies suggest that *Lycium barbarum* extracts and their bioactive components can reduce UV-induced oxidative stress in skin cells, inhibit inflammatory cascades, and indirectly affect photoaging processes. These effects have been attributed to both carotenoids and polysaccharide fractions. Some clinical observations and small interventional studies indicate a possible improvement in skin condition and subjective parameters of its quality when using goji-based products. However, most of the available clinical data have limited evidentiary value, which does not allow for definitive conclusions regarding the dermatological efficacy of goji berries in an anti-aging context [17].

Clinical Evidence

Clinical studies investigating goji berry consumption are limited in number, duration, and sample size. Available trials report improvements in antioxidant status, ocular biomarkers, and subjective well-being [20–22]. Nonetheless, variability in study design, product composition, dosage, and outcome measures limits comparability and precludes strong conclusions regarding anti-aging efficacy.

Safety and Limitations

Goji berries are generally well tolerated when consumed at dietary levels. However, reports of interactions with medications and variability in commercial product composition highlight the need for caution in specific populations [9,22]. Major limitations of current research include heterogeneity of preparations, short intervention periods, and lack of standardized aging biomarkers.

Conclusions

Goji berries represent a biologically plausible functional food with potential relevance to preventive and anti-aging medicine. While experimental studies support antioxidant, immunomodulatory, and metabolic effects, clinical evidence remains limited and most robust for ocular health outcomes. Current data do not support broad claims related to systemic rejuvenation or longevity. Future research should focus on standardized preparations, clinically relevant biomarkers, and long-term randomized controlled trials.

DISCLOSURES

None

FUNDING

None

AUTHORS' CONTRIBUTIONS

All authors participated in manuscript revision, approved the final version, and met the authorship criteria outlined by the International Committee of Medical Journal Editors (ICMJE).

CONFLICT OF INTEREST

The authors declare no conflicts of interest regarding the publication of this article

REFERENCES

- 1.López-Otín C, Blasco MA, Partridge L, Serrano M, Kroemer G. The hallmarks of aging. *Cell* 2013;153(6):1194–1217.
- 2.Kennedy BK, Berger SL, Brunet A, Campisi J, Cuervo AM, Epel ES, et al. Geroscience: linking aging to chronic disease. *Cell* 2014;159(4):709–713.
- 3.Franceschi C, Garagnani P, Parini P, Giuliani C, Santoro A. Inflammaging: a new immune–metabolic viewpoint for age-related diseases. *Nat Rev Immunol* 2018;18(9):523–534.
- 4.Ferrucci L, Fabbri E. Inflammageing: chronic inflammation in ageing, cardiovascular disease, and frailty. *Nat Rev Cardiol* 2018;15(9):505–522.
- 5.Partridge L, Deelen J, Slagboom PE. Facing up to the global challenges of ageing. *Nature* 2018;561(7721):45–56.
- 6.Martel J, Ojcius DM, Ko YF, Ke PY, Wu CY, Peng HH, Young JD. Hormetic effects of phytochemicals on health and longevity. *Trends Endocrinol Metab* 2019;30(6):335–346.
- 7.Calder PC. Nutrition, immunity and COVID-19. *BMJ Nutr Prev Health* 2020;3(1):74–92.
- 8.Minich DM, Bland JS. Personalized lifestyle medicine: relevance for nutrition and lifestyle recommendations. *ScientificWorldJournal* 2013;2013:129841.
- 9.Potterat O. Goji (*Lycium barbarum* and *Lycium chinense*): phytochemistry, pharmacology and safety in the perspective of traditional uses and recent popularity. *Planta Med* 2010;76(1):7–19.
- 10.Amagase H, Farnsworth NR. A review of botanical characteristics, phytochemistry, clinical relevance in efficacy and safety of *Lycium barbarum* fruit (Goji). *Food Res Int* 2011;44(7):1702–1717.
- 11.Inbaraj BS, Lu H, Hung CF, Wu WB, Lin CL, Chen BH. Determination of carotenoids and their esters in fruits of *Lycium barbarum* Linnaeus by HPLC-DAD-APCI-MS. *J Pharm Biomed Anal* 2008;47(4–5):812–818.
- 12.Chen Y, Li L, Zhang R, Liu F. A review of *Lycium barbarum* polysaccharides: structural characteristics, antitumor molecular mechanism and transformation application. *Int J Biol Macromol* 2025;333(Pt 1):148743.
- 13.Feng L, Xiao X, Liu J, Wang J, Zhang N, Bing T, Liu X, Zhang Z, Shangguan D. Immunomodulatory effects of *Lycium barbarum* polysaccharide extract and its uptake behaviors at the cellular level. *Molecules* 2020;25(6):1351.
- 14.Gan L, Zhang SH, Yang XL, Xu HB. Immunomodulation and antitumor activity by a polysaccharide–protein complex from *Lycium barbarum*. *Int Immunopharmacol* 2004;4(4):563–569.
- 15.Luo Q, Cai Y, Yan J, Sun M, Corke H. Hypoglycemic and hypolipidemic effects and antioxidant activity of fruit extracts from *Lycium barbarum*. *Life Sci* 2004;76(2):137–149.
- 16.Li W, Li Y, Wang Q, Yang Y. Crude extracts from *Lycium barbarum* suppress SREBP-1c expression and prevent diet-induced fatty liver through AMPK activation. *Biomed Res Int* 2014;2014:196198.
- 17.Zhang T, Alexa EA, Liu G, Berisha A, Walsh R, Kelleher R. *Lycium barbarum* for health and longevity: a review of its biological significance. *Obesities* 2025;5(2):35.
- 18.Fiedor J, Burda K. Potential role of carotenoids as antioxidants in human health and disease. *Nutrients* 2014;6(2):466–488.
- 19.Cheng CY, Chung-Yuen C, Szeto YT, Benzie IFF. Fasting plasma zeaxanthin response to *Fructus barbarum* L. (wolfberry; Kei Tze) in a food-based human supplementation trial. *Br J Nutr* 2005;93(1):123–130.
- 20.Bucheli P, Vidal K, Shen L, Gu Z, Zhang C, Miller LE, Wang J. Goji berry effects on macular characteristics and plasma antioxidant levels. *Optom Vis Sci* 2011;88(2):257–262.
- 21.Ma ZF, Zhang H, Teh SS, Wang CW, Zhang Y, Hayford F, et al. Goji berries as a potential natural antioxidant medicine: an insight into their molecular mechanisms of action. *Oxid Med Cell Longev* 2019;2019:2437397.
- 22.Amagase H, Nance DM. A randomized, double-blind, placebo-controlled, clinical study of the general effects of a standardized *Lycium barbarum* (goji) juice. *J Altern Complement Med* 2008;14(4):403–412.
- 23.Tang WM, Chan E, Kwok CY, Lee YK, Wu JH, Wan CW, Chan RYK, Yu PHF, Chan SW. A review of the anticancer and immunomodulatory effects of *Lycium barbarum* fruit. *Inflammopharmacology* 2012;20(6):307–314.