

Anti-aging and antioxidant effects of natural active substances in *Caenorhabditis elegans*

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Outline

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Abstract

With the advent of modern medicine, human's life expectancy has more than doubled since 1900 and has increased by three decades since the mid-twentieth century. Parallel healthspan expansion has not followed, and has been impeded largely by the pandemic of chronic diseases that afflicts for approximately 20% of the lifespan. This study investigated the anti-aging and antioxidant effects of two natural active ingredients in *Caenorhabditis elegans*. *Zizyphus jujuba* (jujube water extract, ZJME), rich in antioxidants such as polysaccharides, polyphenols, and cAMP, significantly extended the mean and maximum lifespan of nematodes by 31% and 14%, respectively. It also increased superoxide dismutase (SOD) and catalase (CAT) activities while reducing reactive oxygen species (ROS) and reactive nitrogen species (RNS). qRT-PCR analysis revealed that ZJME enhanced the antioxidant defense system primarily by activating the AMPK and MAPK pathways and inhibiting the IIS pathway. Sturgeon bladder collagen peptides (CPs) have an average molecular weight of 528.5 Da and are primarily composed of GFPGADGSAGPK (16.1%). At a concentration of 25 mg/mL, they can extend the lifespan of nematodes by 22.6%, while also improving body length, motility, antioxidant capacity, apoptosis, and epidermal barrier function. CPs significantly increase the activities of superoxide dismutase (SOD), catalase (CAT), and glutathione S-transferase (GST), while reducing levels of reactive oxygen species (ROS), malondialdehyde (MDA), and lipofuscin. They also extend lifespan and healthspan by activating MAPK (p38/JNK), inhibiting IIS, and regulating the NHR-80/FAT-6 lipid metabolism pathway. Studies have shown that both jujube water extract and sturgeon bladder collagen peptides can delay the aging process by boosting the antioxidant system and regulating key signaling pathways, demonstrating their potential as natural anti-aging ingredients.

- 1 Hou, Z., Zhu, D., Gao, X., Zhao, L., Yang, H., Wang, Q., ... & Wang, N. (2023).
- 2 Antiaging and antioxidative effects of water extract of Zizyphus jujuba Mill on
- 3 Caenorhabditis elegans. *Journal of Functional Foods*, 110, 105829.
- 4 Wang, L., Li, P., Zheng, F., Zhu, Z., Bai, F., & Gao, R. (2024). Collagen peptides from
- 5 sturgeon swim bladder prolong the lifespan and healthspan in Caenorhabditis
- 6 elegans. *Journal of the Science of Food and Agriculture*, 104(9), 5244-5251.