



The Lifespan-Extending and Neuroprotective Effects of *Betula Utilis* Ethanolic Extract in the Nematode *Caenorhabditis Elegans*

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Abstract

Betula utilis (BU), an important medicinal plant that grows in high altitudes of the Himalayan region, has been utilized traditionally due to its antibacterial, hepatoprotective, and anti-tumor properties. Here, we demonstrated the lifespan promoting and amyloid- β -induced toxicity attenuating activity of *B. utilis* ethanolic extract (BUE) in a multicellular model organism, i.e., *Caenorhabditis elegans*. Our results showed that BUE (50 μ g/ml) extended the mean lifespan of *C. elegans* by 35.99% and increased its survival under both oxidative and thermal stress conditions. The BUE (50 μ g/ml) also reduced the levels of intracellular reactive oxygen species (ROS) by 22.47%. The BUE treatment significantly improved the survival of human amyloid- β ($A\beta$) expressing CL4176 worms in response to proteotoxic stress induced by $A\beta$ protein aggregation. Interestingly, the BUE (50 μ g/ml) supplementation was also able to reduce the aggregation of Parkinson's related protein, α -synuclein in the transgenic strain NL5901 and improved chemotactic behavior in wild-type *C. elegans*. Moreover, the BUE-mediated lifespan extension was found to be dependent on *mev-1*, *daf-16*, *hsf-1*, and *skn-1* but not on *sir-2.1* gene. Transgenic reporter gene expression assay showed that BUE (50 μ g/ml) treatment enhanced the expression of stress protective genes such as *sod-3* and *gst-4*. The present findings suggested that ROS scavenging activity together with multiple longevity mechanisms were involved in BUE-mediated lifespan extension. Thus, BUE might have a potential to increase lifespan and to attenuate neuro-related disease progression.

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Speaker Publications:

1. Tacutu, D. Thornton, E. Johnson et al., "Human ageing genomic resources: new and updated databases," *Nucleic Acids Research*, vol. 46, no. D1, pp. D1083–D1090, 2018.
2. M. Sander, B. Oxlund, A. Jespersen et al., "The challenges of human population ageing," *Age and Ageing*, vol. 44, no. 2, pp. 185–187, 2015.
3. C. Lin, X. Zhang, J. Xiao et al., "Effects on longevity extension and mechanism of action of carnosic acid in *Caenorhabditis elegans*," *Food & Function*, vol. 10, no. 3, pp. 1398–1410, 2019.
4. Godic, "The role of stem cells in anti-aging medicine," *Clinics in Dermatology*, vol. 37, no. 4, pp. 320–325, 2019.
5. M. Kozarski, A. Klaus, D. Jakovljevic et al., "Antioxidants of edible mushrooms," *Molecules*, vol. 20, no. 10, pp. 19489–19525, 2015.

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Biography:

Swapnil Pandey has completed his M.Sc. at the age of 23 years from Bundelkhand University and pursuing their doctoral degree from Academy of scientific and innovative research