

Avocado Powder Ameliorates Cognition by Modulating Gut Microbiota and Neuroinflammation

Yueqi Yang¹, Xueyan Wang¹, Caifu Wang³, Runhua Gong^{2, 3, *}

¹School of Medicine, Tongji University, Shanghai, China

²School of Ethnic Studies and Sociology, Yunnan University, Kunming, China

³School of Economics and Management, Pu'er University, Pu'er, China

Email address:

QiQiYang77@163.com (Yueqi Yang), xueyanwang0704@163.com (Xueyan Wang),
caifuwang662026@163.com (Caifu Wang), runhuagong@163.com (Runhua Gong)

*Corresponding author

Abstract

Accumulating evidence highlights that gut microbiota dysbiosis and subsequent peripheral and central neuroinflammation along the gut-brain axis are critical contributors to the initiation and progression of cognitive impairment. Most existing avocado-related neuroprotective studies focus on avocado oil rich in unsaturated fatty acids, whereas few investigations explore the efficacy of whole-fruit avocado freeze-dried powder retaining water soluble bioactive substances such as polyphenols and dietary fiber. The present study aimed to clarify whether avocado freeze-dried powder could alleviate scopolamine-triggered cognitive dysfunction and further reveal its underlying gut-brain axis-related mechanism. In this study, scopolamine was administrated to establish a mouse cognitive impairment model, followed by intragastric intervention with low-and high-dose avocado freeze-dried powder. Behavioral tests were performed to evaluate learning and memory capacity, and related mechanistic studies were conducted. Avocado freeze-dried powder intervention significantly ameliorated scopolamine-induced cognitive impairment, while reshaping the dysbiotic gut microbiota (increasing the abundance of beneficial bacterial genera and suppressing the expansion of pro-inflammatory taxa), restoring intestinal barrier integrity, reducing serum IL-1 β and LPS levels, and thereby inhibiting microglial overactivation and neuroinflammation. The low-dose intervention was more effective in enriching beneficial bacteria and enhancing microbial diversity, whereas the high-dose intervention exhibited greater advantages in restoring intestinal barrier integrity and suppressing the expansion of pro-inflammatory taxa. Collectively, avocado freeze-dried powder ameliorates scopolamine-induced cognitive impairment via modulating gut microbiota, repairing intestinal barrier and blocking gut-derived inflammation transmission to suppress central neuroinflammation. This work provides experimental support for developing whole-avocado-derived dietary supplements against cognitive disorders and makes up for the research deficiency dominated by avocado oil in previous reports.

Keywords

Avocado Freeze-dried Powder, Cognitive Impairment, Gut-brain Axis, Intestinal Barrier, Neuroinflammation